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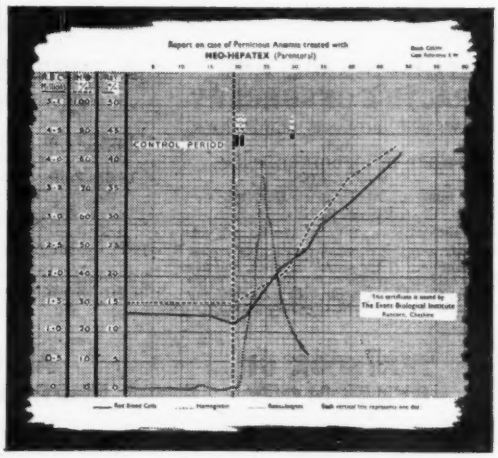

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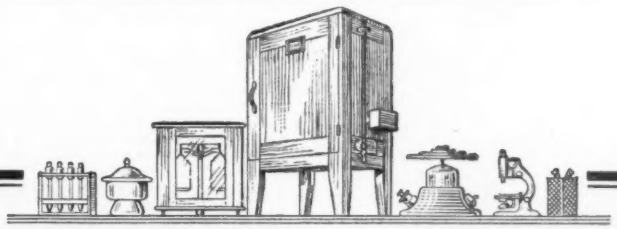

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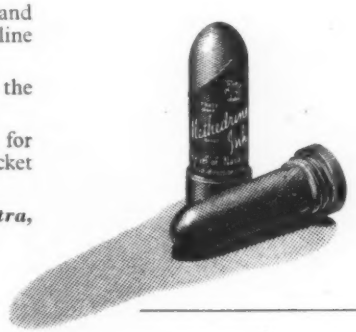

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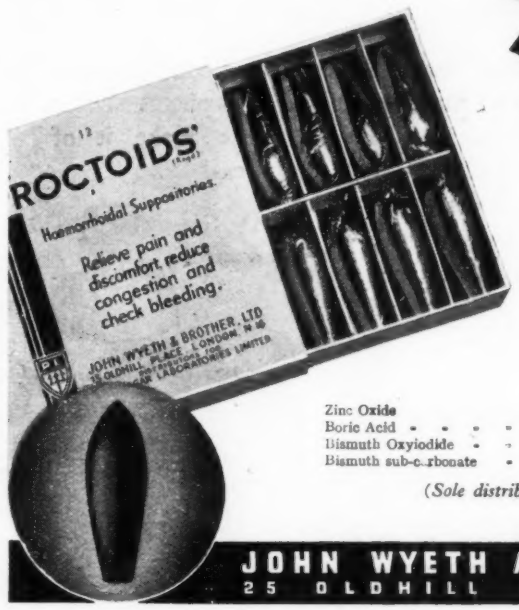
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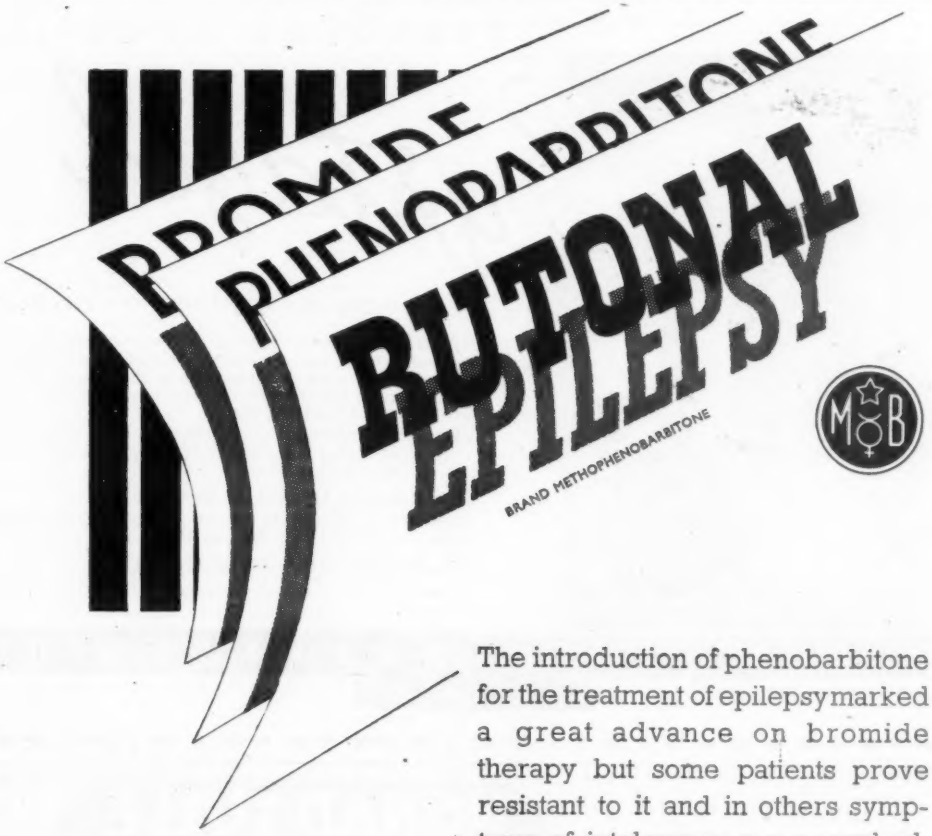

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CERTIFICATION OF DEATH IN INFANCY

F. J. W. MILLER, MB DURH, MRCP, DCH
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DURING 1939 an investigation into the causes of infant deaths was carried out in Newcastle-on-Tyne (Spence and Miller[1]). The essential feature was a personal inquiry by one of two investigators, possessing a knowledge and experience of modern clinical pædiatrics, into the fatal illness and the circumstances of the death of every infant under the age of twelve months. The primary object was to seek accurate information on which to base a plan for the reduction of infantile mortality in Newcastle, but in addition we became interested in the accuracy of certification of death in infancy and the problems concerned therewith. These problems were not described or discussed in the published report.

PURPOSES AND USES OF DEATH CERTIFICATION

Certification of death is a legal duty imposed on the medical practitioner in regular attendance on a patient. He must, in all cases where he has been in such attendance, give a death certificate unless he has reason to suspect that death is due to causes other than natural, or unless the death is sudden from unknown causes or has been directly or indirectly caused by accident. The certificate must give the cause of death to the best knowledge and belief of the doctor and must be completed on the recognised form. After completion it must be delivered to the registrar who registers the death and gives a burial certificate.

The information contained on the certificate is used in preparing the mortality statistics published by the Registrar-General, and their accuracy depends on the care and correctness with which the information is given and the method of classification in use in the Registrar's office. Full information concerning both these points is given in the Manual of the International List of Causes of Death as adapted for use in England, Wales, Scotland and Northern Ireland (HM Stationery Office, 3*s*. 6*d*.), which is "an official statement of the practice in force in the several parts of the United Kingdom with regard to the classification of causes of death" and contains "suggestions to medical practitioners respecting certificates of causes of death." The 1938 edition, based on the fifth decennial revision by the International Commission (Paris 1938), came into operation in England in January, 1940. The introduction of this revision coincided with an important change in the method of classification of causes of death. When only one cause of death is given on a certificate it is accepted as the cause of death, but when two or more causes are given there may be difficulties in selecting one for classification. Before 1940 selection was made according to arbitrary rules; certain causes were preferred before others—e.g., prematurity was preferred to almost any other cause of death in infancy. This method had obvious disadvantages and in 1940 a change was made after a "study of a random sample of 10,000 death certificates showed that instances of obvious misunderstanding of the proper use of the form had become comparatively rare and that there was no longer any need to delay the adoption of a method of selection based on the certifier's opinion as to priority of causes" (Manual, p. 7). Since then, except in certain conditions, the morbid condition which *started* the train of events resulting in death has been considered the actual cause of death. Thus in most cases the practitioner's statement in Space I of the certificate is accepted as the cause of death. When more than one cause is given in Space I, that which was the starting-point of the condition is preferred as the cause of death—e.g., broncho-pneumonia due to whooping-cough is classified as whooping-cough. Causes given in Space I are always preferred to those in Space II unless they are grouped as ill-defined causes of death—e.g., asthenia, marasmus and inanition.[2] If an ill-defined cause is given in Space I and another cause in Space II, the death is classified as the latter—e.g., if the immediate cause of death is given as "marasmus" and in Space II prematurity is given as a cause additional to but not in the direct chain of circumstances leading to death, the death will be classified to prematurity.

In certain conditions the Registrar-General may refer the certificate back to the certifier for additional information. For instance, the deaths of all children of more than three months certified as dying from prematurity are subjected to inquiry; so are deaths certified as pemphigus neonatorum, difficult birth, asphyxia or jaundice of the newborn. Yet, strangely enough, no inquiry is made in deaths due to sepsis neonatorum, precipitate labour, atelectasis neonatorum or icterus neonatorum.

Additional information may be forwarded to the registrar if the certifying practitioner initials the appropriate space on the back of the certificate. In this manner the information is collected and classified for use. After the cause of death has been determined classification is made according to the detailed international list of causes of death, given in full in the manual.

CHIEF ERRORS OF CERTIFICATION

During our investigation it was possible to compare the causes of death as given on the death certificates with the opinion we expressed as to the most probable cause of death after a close consideration of all the available evidence. The clinical classification given in our report was not comparable with the grouping arrived at by tabulating the causes of death given by certification and no direct comparison will be attempted. But after a consideration of each death certificate in the light of all the available information, and making allowances for mere difference in terminology, we estimated that at least a third of the certificates gave an inaccurate or inadequate description of the causes of death. Sometimes the inaccuracy appeared to be due to carelessness in certification but most often it appeared to arise because the practitioner did not know the cause of death yet was compelled to give a death certificate unless he was prepared to inform the coroner. That this difficulty exists is shown by the fact that after a consideration of all the available information there was still a large group of deaths—41 (15%) out of 272—in which we were unable to express an opinion as to the cause of death. In most of these cases certificates had been given. As might have been expected the majority of these deaths (33) occurred at home but some (8) occurred in hospitals under conditions which should have given ample opportunities for elucidation of the causes of death; 13 of these children died under circumstances which required a report to the coroner. In only 2 of the 41 cases had a post-mortem examination been obtained. Two examples will indicate the type of case included.

CASE 38.—Female; 10th child, aged 10½ weeks. Healthy born. Weight at 3 weeks, 8 lb. 10 oz. Progress satisfactory; at 9 weeks weighed 10 lb. 7 oz. The child was found dead in her pram and the mother stated that she had been perfectly well when fed some minutes before. Reported to the coroner; the doctor's deposition stated that death was due to infantile convulsions. No autopsy.

CASE 105.—Male; 2nd child, aged 3 days. Healthy born. Birth-weight 8½ lb. Born before the arrival of a doctor but good colour and appeared healthy. For 2 days thrived and sucked well but on the third day when midwife went to bathe him he was found grey and cold; he died shortly afterwards. Certified as congenital heart disease.

We found that we classified fewer infants as dying from prematurity alone—i.e., uncomplicated by infection, intracranial injury or other factors—than were certified as having died from prematurity. As a contrast however we considered that many more children died from the effects of birth (grouped by us as birth-deaths)—i.e., children suffering from trauma or infections during birth so that they died afterwards. We found that 38 (14%) of the 272 deaths occurred as a direct result of birth, while according to death certificates only 14 (5%) were grouped as birth-injuries. We also differed from the

1. Spence, J. C. and Miller, F. J. W. Report of an Investigation into the Causes of Infantile Mortality in Newcastle-upon-Tyne during 1939. Health Department, Newcastle-upon-Tyne, 1942.
2. These conditions, relating to death in infancy, are given on p. 66 of the Manual of the International List of Causes of Death, 1938 edition.

death certificates in regard to the deaths from infective causes. For reasons given in the published report we considered that the number of children certified as dying from gastro-enteritis (33; 12% of the total) was much greater than the number actually dying from true alimentary infection (12; 4·5%). With this degree of inaccuracy it is difficult to accept the official records of causes of death as representing the true incidence of the various causes of death operative in the first year or to base schemes for the reduction of infantile mortality upon them.

CAUSES OF INACCURACIES AND ERRORS

The errors found are the result of several different but related causes.

The difficulty of diagnosing disease in infancy is so great that no opinion could be given in 15% of the whole series of 272 cases. This difficulty must be recognised, and it must be accepted that in contrast with adult medicine so little is yet known of the clinical syndromes of disease in infancy that even after the fullest clinical and pathological investigation the causes of death in many cases may not be discovered. The remedy is the establishment of adequate facilities for research into the nature of disease in infancy, for even experienced physicians with extensive knowledge of disease in infancy are often at a loss to reach a diagnosis.

Inadequacy of training in pædiatrics.—The medical profession generally has undoubtedly received insufficient training in the care of the sick infant and the physiology and development of the healthy infant. This is because in England the subject has not been adequately supported by the teaching schools and there has been a lack of facilities both for training pædiatricians and for giving adequate experience and postgraduate instruction to practitioners.

Failure to call medical aid.—The first symptoms of illness in infants are often so slight that parents, especially in poor economic circumstances, frequently fail to call medical aid till their child is gravely ill, moribund or even dead. Indeed in 27 of the 272 cases a report to the coroner was required and many of these children had been found dead in bed never having had medical attention. Only in 2 cases was an autopsy held. Two examples may be interesting.

CASE 14.—Female; 3rd child, aged 6 weeks. Family in poor circumstances living in an old tenement. Birth-weight 7 lb. Full-term infant but never vigorous. The doctor was called to find the infant quite moribund. He could not elicit any clinical evidence of the nature of disease except that the infant was said to have had a cold a few days before death. Death certificate signed as congenital heart disease.

CASE 32.—Male; 1st child, aged 28 days. Family poor but decent. Birth-weight 6 lb. Healthy born infant, breast-fed. He made good progress till a few days before death when he is said to have been unwell but no medical attendant was called. On the morning of the 28th day the child was found dead in bed. The coroner was notified and the doctor's deposition gave infantile convulsions as the cause of death.

As a result of these difficulties the doctor finds himself compelled to give a death certificate which will satisfy the registrar when he may have little knowledge of the actual cause of death. The problem is important if any value is to be set on the records concerning causes of death in infancy. Yet recognising the conditions of medical practice it was no great surprise when doctors frankly admitted that in such difficult circumstances they use terms such as congenital heart disease, marasmus, inanition, prematurity, atelectasis or gastro-enteritis which they know will satisfy the registrar. In the great majority of cases the doctors are genuinely concerned about the situation yet there does not appear to be anything they can do.

In addition to the difficulties of accurate death certification, study of the International List of Causes of Death raises doubts whether the present classification can make the best use of the information available. There does not appear to be any reference to this point in English medical writings, but in America, Bundesen and his co-workers,[3] and more recently Potter and Adair [4] have criticised the classification, the latter stating that it "needs revision badly" and giving examples of its deficiencies. In the first year of life, apart from conditions which may appear at any age, all causes of death are classified under five heads—congenital malformations, congenital debility, premature birth, injury at birth, and other diseases peculiar to the first year of life. Included under each of these titles is a large group of conditions, some of which have no modern clinical significance. Thus, prematurity [5] is admitted as a cause of death throughout the whole of the first year, subject to inquiry after three months. Yet it is safe to say that no infant over the age of a month dies from the effects of prematurity alone. The condition might be a contributory factor but there is no doubt that many of the deaths returned each year as due to prematurity are primarily due to birth-injury or infection. Would it not therefore seem reasonable to refuse to accept prematurity as the sole cause of death in a child after the 28th day?

Included under the heading congenital debility are many causes of death—asthenia, atrophy, inanition and marasmus—all of which are considered to be ill-defined causes and are accepted only when no other cause is given. None of these has any place in modern clinical pædiatrics. In 1939, seven children were certified as dying from such causes but after inquiry it appeared that three had died from birth-injuries, two from infective causes, one was a premature child weighing 2 lb. which lived only 4 hours, and the last was a child seen moribund on one occasion and there was no evidence of the cause of death.

Under the title "other diseases peculiar to the first year of life" there are five sections containing many different causes of death such as asphyxia, infections, jaundice, &c. Section A—"asphyxia during or after birth, atelectasis"—includes cases of asphyxia pallida, atelectasis, white asphyxia, &c. These conditions are almost always the result of some trauma or accident during delivery and are often the signs of intracranial hæmorrhage; as causes of death they should more properly be classified with the birth-injuries. This, to some extent, is the reason why we found a higher percentage of birth-injuries than would have appeared in a classification according to the International List.

Convulsions are still often given as a cause of death in infancy; 16 (6%) of our cases were so certified. Inquiry is made as to the cause of the convulsions in all children of 6 months or over and they are grouped under a separate title: "Convulsions in children under 5 years." In the group are included cerebral convulsions, eclampsia, fits, spasmophilia and tetany, so that it is possible to classify convulsions which might be merely symptomatic of infection with convulsions due to infantile tetany.

There can be no doubt, however, that although the classification does require revision, the most important factor for improving the accuracy of certification is a greater knowledge of disease in infancy, and this requires extended facilities for teaching both pregraduate and postgraduate students.

SUGGESTIONS

In addition to extension of teaching facilities, the problems of death certification in infancy require close consideration and I therefore offer certain suggestions for criticism and further discussion.

(1) Further attention to the importance of accurate death certification, its uses and method of classification should be given by the medical profession.

(2) Each member of the profession should be supplied with a copy of the Manual of the International List of Causes of Death. The copy of the "Nomenclature of Disease" which is provided, while it gives the nomenclature recognised by the Royal Colleges, contains no information or suggestions concerning death certification. In our experience only a small minority of practitioners have any knowledge of the manual or the valuable information it contains.

3. Bundesen, H. N., Fishbein, W. I. and Dahms, O. A. *J. Amer. med. Ass.* 1937, **107**, 337.
4. Potter, E. L. and Adair, F. Fetal and Neonatal Death, Chicago, 1940, p. 9.
5. "It is desirable that as far as possible the definition of prematurity shall conform with that recommended by the Royal College of Physicians, namely, that in conformity with the standard in international use an infant whose birth-weight is 5½ lb. (approximately 2500 grammes) or less shall be considered, for the purpose of comparison of records, as immature or prematurely born according as the estimated period of gestation is full-time or less."—Manual of International List of Causes of Death, p. 67.

(3) Consideration should be given to the provision of a mechanism which would enable a doctor, in cases which do not require notification to the coroner, to indicate that he does not know the cause of death, so that he can obtain an autopsy before giving a final certificate.

(4) A committee of clinical pædiatricians should be set up to consider revision of the classification of causes of death relating to the first twelve months of life.

(5) Consideration should be given to the advisability of having a special form of death certificate for infants so that it would be possible to collect information concerning such factors as birth-weight, feeding, position of child in family, &c.

The investigation on which this paper is based was carried out in association with Dr. J. C. Spence, whom I wish to thank for stimulation and criticism.

THE VALUE OF LOCAL CHEMOTHERAPY IN WOUNDS AND BURNS *

D. N. MATTHEWS, MD, MCH CAMB, FRCS
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To be convinced of the usefulness of the sulphonamides when applied locally is easy, but to produce irrefutable evidence to prove it is very difficult. Proof can be attempted in many ways of which the most reasonable seemed to me to be to study the bacteriology of wounds, or to measure accurately their rate of epithelialisation, or to take a series of colour photographs at regular intervals to show the progress of the wound compared with controls. This last had to be abandoned owing to the impossibility of obtaining sufficient photographic material in war-time. Measurement of epithelialisation was not selected because accurate comparison with controls would be impossible owing to the varying depth of wounds and the differences in the amount of tissue damaged with resultant slough formation ; moreover, wounds are of such irregular shapes that measurements would be only approximate.

Choice fell therefore on bacteriological study, and the object was to find out if the local application of the sulphonamides lowered the number of living organisms recoverable from a known quantity of exudate. Of necessity one has to deal with small quantities of exudate since the wounds become comparatively dry after only a few days' local chemotherapy, so that experimental error must be considerable. Nevertheless, one is repeating the same procedure each day and taking the exudate from exactly the same place in the wound, so that if the figures arrived at are of little value in themselves the graph which they compose is a true indication of the rise or fall in the number of living organisms present.

VIABLE COUNTS IN INFECTED WOUNDS

The number of living organisms—the " viable count " —has been obtained by sucking a known quantity of exudate, from a carefully noted and easily identifiable spot in the wound, into a red-cell pipette and diluting with broth to produce known dilutions of the exudate. These have then been plated out and incubated for 24 hours, at the end of which time the number of colonies present has been counted by holding the plate before a brightness screen. By choosing the plate whose dilution has yielded a reasonable number of colonies this is not very tedious and multiplication of the figure obtained by the dilution gives the number grown from the original measured quantity of pus in the pipette. This procedure is repeated each day, care being taken that the pus comes from exactly the same spot and that the wound is immediately covered with dry gauze each time it is repowdered after taking a sample. Although I am aware that the daily irrigation with saline or preferably with hydrogen peroxide assists the action of the drugs and that moisture greatly enhances their value I have been careful in these experiments to avoid even this complicating factor as far as clinical requirements would allow so that no doubt could be thrown on the part played by the drugs or the interpretation of the results.

A total count of both living and dead organisms was also made on the first few wounds examined by counting the number of leucocytes in a cell-counting chamber and then counting the ratio of organisms to leucocytes, from which the total number of organisms present could be calculated, but this was abandoned since the chance of inaccuracy is too great for the results to be of any value owing to the irregularity of spread both of leucocytes and of organisms through the microscope fields.

The main difficulty in estimating the viable count was to be sure that a quantity of the drug sufficient to inhibit the growth of organisms was not drawn up into the pipette with the exudate and transferred to the broth cultures. This was overcome by making use of the observation of Woods (1940) that para-aminobenzoic acid is antagonistic to the action of sulphanilamide. A small quantity of para-aminobenzoic acid was added to the culture medium to antagonise any traces of the drug sucked into the pipette with the exudate.

To obtain suitable infected wounds is not as easy as might be supposed since local chemotherapy has become so popular that the majority have already been treated before bacteriological study can be started ; the necessary evacuation of cases to base hospitals from the cities where they are first treated is also an obstacle in the way of the uninterrupted study of a large series.

In my first series of experiments I have studied 20 cases over periods ranging from one to three weeks, and infection denoted by tissue invasion with the production of varying degrees of necrosis was present in all of them. The series included air-raid casualties which were too ill to be moved, secondary sepsis following surgery, burns and infective conditions which had been laid open for drainage.

In no case which I have studied by this technique have I found a wound in which the viable count was not lowered, although the amount of the fall varied considerably according to the type of organism with which the wound was infected. The number of streptococci always dropped in the first 24 hours after application of the drug and the fall has been continued each day, being attended by great improvement in the macroscopic appearance of the wound whose granulations looked healthier with disappearance of the exudate and loss of circumferential inflammation of the skin. Indeed the present enthusiasm for local chemotherapy has resulted in the streptococcus becoming a rare and unusual contaminant to be isolated from a treated wound or raw surface.

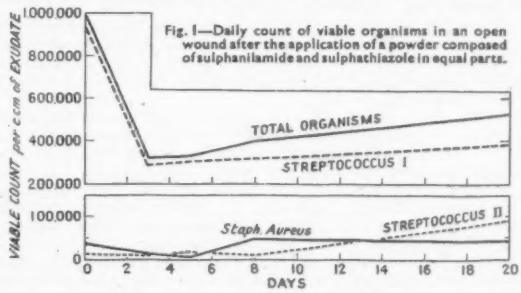

Fig. 1 shows the influence of the daily application of a powder composed of a mixture of sulphanilamide and sulphathiazole in equal parts to a septic wound of the hand of a fireman injured in a raid. Severe head injury prevented his transfer to the base and so three weeks' observation was obtained. This shows an immediate and profound drop in the viable count of the chief contaminant, the streptococcus, while the total viable count shows a parallel fall. Lesser contaminants were the *Staphylococcus aureus*, which showed a less violent drop, and a non-hæmolytic anaerobic streptococcus which showed a steady unaltered count, but in all three and in the total viable count there was a gradual rise as time went on. This is a characteristic finding and has been noted in most of the cases examined. I do not know the cause. Welling up from a deep pocket will not account for it since it is also seen in burns and in surface lesions. Perhaps it indicates some acquired tolerance for the drug which is developed by the organisms

* Part of a Hunterian lecture, delivered before the Royal College of Surgeons of England on Feb. 17, 1942.

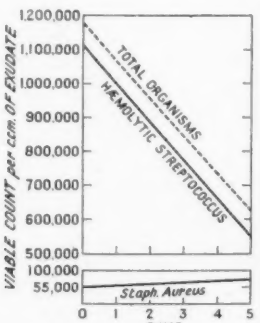

Fig. 2—Effect of the application of sulphanilamide on the daily count of viable organisms in an infected abdominal wound.

after repeated exposure to it. Colebrook (1940) has shown that the more virulent the organisms the more effective are the drugs, but some of the virulent streptococci may possibly persist in a form more resistant but less pathogenic or non-pathogenic. The survivors may be but shadows of their former selves. This is supported by the fact that skin-grafting can be satisfactorily undertaken in spite of the continued survival of some organisms after chemotherapy. Tolerance has been investigated by Stamp (1939) who reports the isolation of a factor from the streptococci themselves which is inhibitory to the action of sulphanilamide, and has shown that the addition of dead organisms to cultures containing sulphanilamide favours the survival of the organisms under culture and antagonises the sulphanilamide. This graph gives no indication of clinical improvement since it fails to record that by the end of three weeks the wound was practically healed, being about a tenth of its original size and healthy in appearance in spite of the persistence of some organisms.

Fig. 2 comes from the case of a girl of 23 who developed sepsis in the abdominal wall after the removal of a gangrenous appendix and shows a similar dramatic fall in the viable count of the predominant organism, the hæmolytic streptococcus, while the small number of staphylococci rose slightly and gradually throughout. In the light of further knowledge I feel sure that if the examination had been continued for more than six days the gradual slow rise in the streptococcal count would have appeared. Once again clinical improvement was rapid and recovery soon ensued.

Chronic wounds with indolent sloughs and an unreactive appearance are usually infected primarily with the hæmolytic staphylococcus and the *Bacillus pyocyaneus*, and occasionally with the *B. coli*, and are accompanied by non-pathogens, the most frequent of which are the diphtheroids, the *Micrococcus catarrhalis* and the non-hæmolytic staphylococci. The streptococcus is rarely found on such wounds. The bacteriological improvement in these cases was greater than had been expected and I am inclined to regard sulphathiazole as more effective than sulphanilamide in such circumstances, although the series is too small to allow of a dogmatic statement. One conclusion however which I have been able to draw is that sulphathiazole is a valuable drug when locally applied to obstinate tuberculous sinuses. By this means alone I have seen such a sinus heal in the neck and in the groin where it has resulted from operations, and in the scrotum in a case of tuberculous epididymo-orchitis and on the sternum from an abscess in bone which had been unsuccessfully operated on. It is more likely that these results are from destruction of the secondary contaminants of the wound than that they represent bacteriostasis of the tubercle bacilli themselves, but at all events the wounds healed and tuberculosis became clinically completely quiescent.

Fig. 3*a* comes from an amputation stump in an airman whose finger had to be removed although the hand had also been burnt. The operation necessitated the use of a flap which consisted only of scar tissue which sloughed. The wound was very slow in healing until sulphathiazole was applied, after which healing was greatly accelerated and the granulations became firm and red. The characteristic kick in the graph already discussed is shown, and the great fall is gratifying seeing that the predominant organism was the *Staph. aureus* and that the wound was extremely chronic.

Fig. 3*b* is from an extensive burn of the hand to which sulphathiazole was applied. It shows the reduction which can be brought about even when one is dealing with the *B. pyocyaneus*. Research has not offered much prospect of success when this organism has been exposed to any of the sulphonamides in vitro, but it is most definitely affected when it is growing on an open wound. Once again the characteristic kick is shown, rising in this instance rather higher than in the majority but nowhere near as high as the original level. I was not able to obtain the figures for each organism separately but all three shared in the production of this rise. The patient was successfully thiersch-grafted on the seventh day, a layer of the powder being left beneath the graft.

The wound from which the counts illustrated in fig. 3*c* were obtained was particularly chronic and sloughs were present in it. The bacteriological results were better than was indicated by the appearance of the wound which looked unreactive throughout, but the sloughs came away at the end of the week and the wound was sutured and healed by first intention. Maybe the treatment was fortuitous in coinciding with the separation of the sloughs, maybe it assisted it, but it brings out several interesting points. First, it did not retard their separation which is a criticism which has been levelled at local chemotherapy; secondly, the action of the drug was unimpaired by the presence of necrotic tissue in spite of the inevitable presence in it of split protein products; and thirdly, it is unlikely that first intention healing could have been obtained in similar circumstances without the help of the sulphonamides.

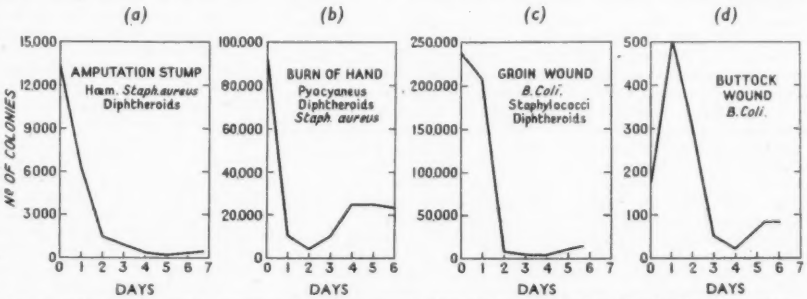

Fig. 3—Daily count of viable organisms in chronic wounds after the local application of sulphathiazole powder.

Fig. 3*d* comes from a wound produced by laying open widely a fistula-in-ano. The bacteriological study was begun a week after operation. It is a difficult area in which to apply dressings but trouble was taken to exclude the possibility of secondary fæcal contamination. The considerable initial rise at the end of the first day's treatment was probably due to the presence of minute quantities of eusol with which the wound had previously been dressed, since this substance, as Francis has pointed out (1941), inhibits the action of the sulphonamides. If this is the explanation it is a good demonstration of the harm which can be done by allowing chemicals to come in contact with wounds when sulphonamide therapy is in use. Subsequently the graph showed a fall almost to zero on the fourth day followed by a slight but

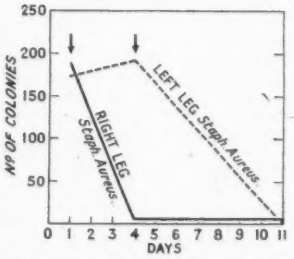

Fig. 4—Effect of the application of sulphanilamide powder on the colony count of viable organisms recoverable from symetrical wounds of both legs. The arrows denote the first application of the drug to each leg.

maintained rise. In this case the culture was of pure *B. coli*.

These results are typical of all the cases I have studied and establish proof that the number of living organisms per unit area of the wound can always be profoundly

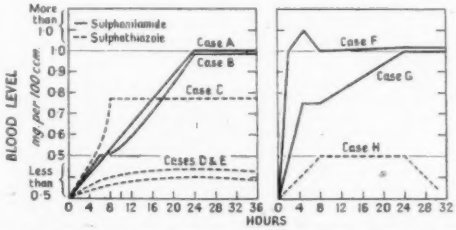

Fig. 5—Blood levels. Cases A-E chronic wounds (4 sq. cm. approx.). Cases F-H burns (7 sq. cm. approx.). All exposed to 1·5 g. of drug for 36 hours.

lowered by the local application of the drugs. Sulphanilamide and sulphathiazole were the two drugs used; the choice depended on the type of wound and the nature of the organisms, sulphathiazole being chosen for the more chronic cases and for infections predominantly staphylococcal, sulphanilamide for acute and streptococcal lesions, and a mixture of the two in equal parts where this seemed to be indicated. A similar fall has not to my knowledge been recorded when the drug has been administered by mouth, and it seems unlikely that the results were merely consequent on the absorption from the raw area into the blood-stream with the production of a systemic action. This belief was strengthened by a case of symmetrical scalds of both legs and feet. Application of sulphanilamide to one leg left the colony count of the opposite one quite unaltered although a profound fall was seen in the treated limb, while treatment of the opposite side three days later produced in it an equally dramatic fall (fig. 4).

LEVELS OF SULPHONAMIDE IN BLOOD

In order to obtain further proof that the action was local another series of experiments was undertaken to determine the blood levels following local chemotherapy. A measured quantity of the drug was applied to a wound of known extent and left for 36 hours during which time blood was collected at intervals; 36 hours was chosen because it was found that the blood level had reached its peak after a single application by this time and because it is not practicable to leave such a wound for longer than this without re-powdering and applying fresh dressing.

In all, 8 cases were examined by this method, 4 using sulphanilamide and 4 using sulphathiazole. Fig. 5, cases A–E, shows the results in 5 chronic wounds, the drugs being estimated by Marshall's colorimetric method. Extremely low values are recorded, the highest reaching 1·0 mg. per 100 c.cm. while two of the sulphathiazole administrations produced only traces too small to be recorded by the colorimeter. Sulphathiazole produced lower figures than sulphanilamide and appeared to reach its peak rather more quickly. All these wounds were approximately 4 sq. cm. in area. The remaining 3 cases, F–H in fig 5, were burns, and the raw surfaces were larger—approximately 7 sq. cm. in area. The peak figures in the burns are much the same, 1·0 mg. per 100 c.cm. being only once exceeded and that only in a single sample. It is noteworthy that the rate of absorption has been greater, the peak being reached in from two to eight hours instead of twenty-four hours, and that once again sulphanilamide gave the higher readings. These figures are in agreement with those of Hawking and Piercy (1941), who showed that the peak in 24 cases was reached about twenty-four hours after application and fell rapidly afterwards. The low figures are in striking contrast with the level of 3·5 mg. per 100 c.cm. reached in only 2½ hours after the oral administration of the same dose of 1·5 g. as recorded by Fuller and James (1940).

It seems probable that to some extent the blood level after local application is proportionate to the extent of the area sprayed and to the amount of the drug used, and high figures with occasional cyanosis have been recorded when large doses have been applied to very extensive areas (Hooker and Lam 1941), one case having severe toxic manifestations and requiring the immediate removal of the powder after receiving the enormous dose of 120 g. in two days. But it is also probable that absorption is greatly influenced by the type of wound into which the powder is placed. Jensen and his colleagues (1939) recorded comparatively high figures after the application of only a small amount of the drug to torn muscles and fractured bones followed by primary suture, but the level dropped quickly after the first twenty-four hours. It seems therefore that care should be exercised in the administration of large doses to surfaces whose vascularity will allow of rapid absorption, but it is equally clear from the present experiments that successful bacteriological results are obtained when only a trace or at most 1 mg. per 100 c.cm. has been absorbed into the blood-stream from the 1·5 g. locally applied. It seems almost certain therefore that the result is due to local action alone and is not dependent on absorption into the blood-stream.

LEVELS OF SULPHONAMIDE IN URINE

In these cases the amount of sulphonamide in the urine was estimated over the same period in order to find out what part was played by the kidney. It is seen (fig. 6) that cases A and B in which sulphanilamide was used showed an excretion representing 12% and 10·7%, while the sulphathiazole yielded 7·4 %, 7% and 3·5%. These amounts do not of course represent the total excretion since the drugs were obviously excreted for some hours after the dressings had been removed and it is perhaps a pity that samples were not collected until the urine was free, but all show that the peak excretion had been reached at twenty-four hours and passed by thirty-six hours, and that the total amounts are considerable. The urinary concentrations of course vary with the total amount of urine secreted and are

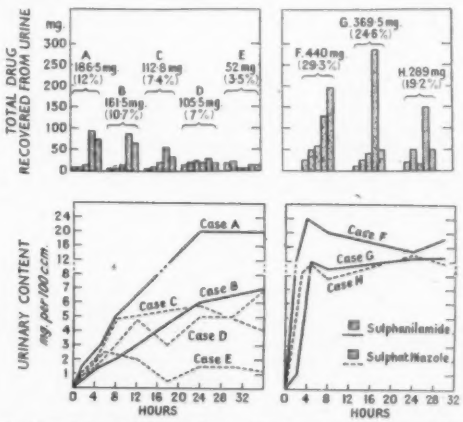

Fig. 6—Cases A-E and F-H as in fig. 5. The upper graphs show the amount of the drugs excreted in the urine between the application of the sulphonamide dressing and its removal, and the percentage of the 1·5 g. applied which these figures represent. In cases A-C specimens were taken at 2, 5, 8, 24 and 36 hours; in cases D and E at 6, 12, 18, 24, 30 and 36 hours; and in cases F-H at 2, 5, 8, 24 and 30 hours. The lower graphs show the concentration of the drugs in the urine over the same period.

only of interest to show that with the passage of small quantities of a highly concentrated urine they can rise to considerable heights even though the blood concentration is still low. Case A shows a concentration of 20 mg. per 100 c.cm. in the urine with a blood level of only 1 mg. per 100 c.cm. in a sample taken at the same time. The larger wounds, as would be expected, show higher figures, the total excretion in 30 hours from the time of application of the drugs being 29·3% in F, 24·6% in G, and in H, using sulphathiazole, 19·2% of the 1·5 g. applied. The urinary concentrations rise as high as 24 mg. per 100 c.cm. and are rarely below 12 mg. per 100 c.cm.

From these observations it is seen that within the first thirty-six hours, in spite of a very low concentration of the drug in the blood-stream, the kidneys are called

on to excrete up to 29% of the dose applied and have temporarily to bear high concentrations of the drugs in the urine. It therefore seems that care should be taken to exclude renal damage, as evidenced by the appearance of casts, red cells and albumin, in those cases which undergo prolonged local chemotherapy; particularly is this so in treating a large and vascular surface since the amount excreted appears to bear no relationship to the blood level, which is always low. I was surprised to find that so much of the drugs had passed through the kidneys and am aware that I have not studied the urine in as much detail as seems to be necessary from these results. Generalised toxæmia following local chemotherapy I have never seen.

PROPHYLACTIC VALUE

Evidence has been put forward to prove the value of local chemotherapy in the treatment of wounds which are already infected, and in which organisms have invaded the tissues with the production of a greater or lesser amount of slough, and the fact that this action is produced locally has been established. Proof of its value in prophylaxis, however, is still wanting and the difficulties here are great. There is a very large group of cases in which one is clinically certain that organisms have been introduced but where chemotherapy formed part of the surgical toilet at the original debridement. This group includes air-raid injuries, battle casualties, compound fractures and burns, and in order to establish proof of the prophylactic action of the sulphonamides it would be necessary to run a parallel series of similar cases from whom the drugs had been withheld. My conviction of their life-saving qualities is so great that I do not feel it is justifiable to withhold them from any such case and I must be content therefore with clinical impressions and observations.

There are, however, a few published papers which are useful. Jensen and his colleagues (1939) compare the incidence of sepsis in all compound fractures admitted to their hospital during a year before the introduction of the sulphonamides with that occurring afterwards over a similar period. The incidence was lowered from 27% to 4·8%, local chemotherapy being the only alteration in treatment. King (1941), writing of experiences in the BEF, tells of a ready-made controlled experiment which was forced on him through shortage of the drugs. Only the most severely wounded could be given local chemotherapy, yet he had no deaths from this group so long as they were under his care in the casualty clearing station, whereas several of the less severely injured to whom he had been unable to give the drugs died. Handley (quoted by Jeffrey 1940) was able to study bacteriologically 25 cases of injury and compound fracture occurring in the Army before the German advance began, and found that 23 of the 25 remained sterile after the local application of sulphanilamide. Johnson and Davis (1940) report from America what they describe as "excellent results and primary union" in 273 cases of infected wounds with local chemotherapy.

At the London civilian hospital to which I was attached 25 Dunkirk casualties were admitted and about 650 air-raid casualties. Of the Dunkirk cases all with open wounds had previously received sulphanilamide, the majority in the form of a locally applied pack, and a few by mouth. Most of the wounds were five days old and the lack of sepsis was remarkable; healing was already taking place and surrounding cutaneous infection was minimal or absent. These findings are similar to those of the surgeons working in other hospitals to whom I have spoken.

Almost all air-raid casualties had multiple wounds, glass cuts being plentiful in the earlier days, and the routine treatment of all clean cut wounds, however caused, was to remove the foreign body, apply the drug and suture the skin. This was followed by primary union in the vast majority of cases. But administration of sulphanilamide by mouth must follow within 48 hours and be continued for at least four days, since otherwise there is a danger that organisms will recover their virulence after the absorption of the drug before being attacked and destroyed by the leucocytes. Experimental evidence on this point has been brought forward by Legroux (1940), who showed that if organisms and sulphanilamide are applied together to a wound which is then sutured sepsis will appear in some of the animals, though it is delayed, while if the wound is reopened and re-sprayed sepsis is prevented. It seems reasonable to add sulphathiazole to the sulphanilamide powder in such circumstances owing to its lower solubility and slower absorption. The administration of 3 g. of sulphanilamide by mouth daily in divided doses for four days was the routine we followed; this appeared to be quite sufficient to supplement the local application and could be discontinued without risk after this time if no sepsis was evident.

Those wounds in which there was gross skin loss and maceration of muscle and in which compound fracture was present were subjected to thorough debridement followed by irrigation with hydrogen peroxide through a Higginson's syringe, after which plaster was applied to the limb and the cast cut from end to end and windowed over the wound. Powder was then insufflated and the wound covered with dry sterile gauze. The irrigation with peroxide and the local application of sulphanilamide were repeated daily through the window and it was striking how quickly the wounds improved. Hydrogen peroxide converts sulphanilamide into its oxidation products, which appear to be the active anticatalytic agents, so that this therapy seems logical on chemical grounds and certainly is successful in practice. It has already been advocated and tried by Schneider (1941) in America.

On ten occasions *B. welchii* were isolated from the wounds of air-raid casualties, occurring most commonly in the lower limb but including one case of infection of the brain. In one case only—the first—was an amputation performed, and none died. I am aware that the presence of anaerobes does not necessarily mean clinical gas gangrene but in these cases local crepitation was present or the muscles were friable, non-vascular and of the characteristic colour. It is therefore of some importance to note that all were treated with extensive debridement, daily peroxide soaks followed by sulphanilamide application through their windowed plaster and were in addition injected intramuscularly with anti-welchii serum. The rapid improvement in their local and general condition was gratifying. Spreading gas gangrene never occurred.

Rest of the infected tissues by the application of plaster-of-paris is very important and should be carried out whenever possible, while the end-to-end cut will greatly add to the patient's comfort besides being the only way to guarantee that gangrene cannot occur while supervision is intermittent during transfer to a base hospital. Windowing should always be large.

Many surgeons have pointed out that it is difficult to obtain an even distribution of powder in wounds and that failures are sometimes due to a part of the wound escaping the direct contact of the drug. The ability to penetrate and to spread appears to be very limited and Hawking (1941) has shown experimentally that at a distance of 2 cm. no more of the drug is present than is found in the muscles of the opposite limb. To overcome this difficulty Schneider (1941) has suggested that a supersaturated solution should be prepared by warming so that on being run into the wound it would be deposited in every nook and cranny as the fluid cooled. Sulphanilamide is soluble only to about 0·8% at room temperature but I have determined that at 105° F., which would be safe for local exhibition, this figure is raised to 3·0% in normal saline. Schneider actually tried this using heated peroxide but this substance is so unstable that its value is considerably impaired by heating, added to which there seems to be an increased risk of toxæmia following its use. To add the warm saline solution after peroxide irrigation would seem more logical.

One other word of caution. Procaine and its allies contain esters of para-aminobenzoic acid and therefore exert an antagonistic influence on the drugs, so it is necessary to be particularly careful that these are injected round the wound and not into it if their use is essential. Cocaine is not antagonistic as it does not belong to this group of drugs. Eusol, as Francis (1941) has pointed out, renders the drugs inert so it must be avoided, and it is wise to use dry gauze, or gauze soaked in saline in the case of a dry wound, rather than apply any antiseptics with the drugs.

HARMFUL EFFECTS

Research in this country and America has so far brought forward no convincing evidence that the sulphonamides are capable of injuring the leucocytes or the tissues to which they are applied, despite one early report by Bricker and Graham (1939) that the tensile strength of fibrous tissue was diminished; this has not been confirmed. Russell and Falconer (1940) have studied the rabbit's brain after the application of sulphanilamide and found no irritative or inflammatory changes at the site of application. Glynn (1941) has demonstrated that the organisation of an artifically produced intramuscular hæmatoma takes no longer in its presence, while Key and Burford (1940) have checked radiologically the rate of union of fractures in the rabbit's foreleg in the presence of the drug and found it to be identical with that of controls. Bickford (1941) reports that there is no evidence of an inflammatory reaction in the synovial fluid after its exhibition in a joint. Colebrook and Francis (1941) found that sulphanilamide certainly had no adverse effect on the healing of superficial wounds infected with hæmolytic streptococci, and it has been my experience that the chances of the "take" of a tissue so delicate as a Thiersch graft are in no way impaired by the presence of the drug sprayed over the raw area, and in the presence of sepsis are considerably enhanced.

SUMMARY

Experimental work in human wounds has demonstrated that the local application of sulphonamides greatly lowers the number of living organisms in an infected wound and that this action is produced locally.

These results are obtained when only a trace, or at most 1 mg. per 100 c.cm., of the drug is present in the blood-stream, but over the same period the kidney may be called on to excrete a fair percentage of the total quantity exhibited, so that when only a small quantity of urine is passed a high concentration of the drug may be found in it. This suggests the advisability of frequent examination of the urine for signs of renal damage particularly when surfaces of more than average vascularity are under prolonged treatment.

The great benefits of this form of therapy have been illustrated by reference to macroscopic improvement, to the separation of sloughs and to the results of early grafting and primary suture, while its value in the treatment of tuberculous sinuses has been emphasised.

In prophylaxis the sulphonamides are of great value, but after primary suture small doses must be given by mouth for four days. For wounds in which primary suture is impossible plaster-of-paris is a valuable adjunct but only in so far as it puts the injured part at rest. The plaster should be windowed allowing the regular daily application of the sulphonamides after peroxide irrigation. The use of a supersaturated solution obtained by dissolving in saline at 105° F. is suggested in order to obtain an even distribution of the drugs in the recesses of the wound. I find no virtue in the practice of encasing an unhealed, infected wound in a closed plaster.

Chemicals such as eusol should not be used when local chemotherapy is in progress since the majority of such drugs antagonise the sulphonamides as do also the procaine group of local anæsthetics.

I wish to thank the Director-General of the RAF Medical Services for permission to deliver this lecture; the commanding officer and staff of the RAF hospital to which I am attached, and the staff of the RAF Institute of Pathology, especially Flight-Lieutenant D. E. Price; and the staff of the Westminster Hospital, especially Dr. J. G. Humble, to whom I am indebted for the bacteriological technique.

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MAXIMAL RESPONSE TO LIVER THERAPY IN PERNICIOUS ANÆMIA

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WIDE differences exist in the amount of liver extract used in the treatment of pernicious anæmia. This arises partly from the employment of extracts of low potency, partly from custom. Before steps can be taken to remedy this it is necessary to establish criteria of potency. With this in view the data given below were collected from the records of the pathological department of the Royal Hospital. It is now established that oral therapy is wasteful and consideration has therefore been confined to preparations for parenteral use. The intravenous route was never used.

Minot and his colleagues (1928) were the first to introduce a formula from which the potency of liver extracts could be determined; this was derived from the reticulocyte response. Their formula was:

$$EpR = \frac{EoR}{1 - R} = 0{\cdot}73 - 0{\cdot}2\ Eo$$

in which Eo is the initial red-cell count, Ep the red-cell count at the peak of the reticulocyte rise and R the peak reticulocyte percentage. This was subsequently modified by Riddle (1930) to:

$$R = \frac{0{\cdot}73 - 0{\cdot}2\ Eo}{0{\cdot}73 + 0{\cdot}8\ Eo}$$

Later it was observed that the rise in red cells and hæmoglobin does not in every case follow the rise in reticulocytes and vice versa. The aim of liver therapy is the restoration of a normal red-cell count; the attainment of this and the time in which it is reached must therefore be the values for the assessment of potency of the therapeutic agent. This was pointed out by Murphy (1933):

"With the introduction of highly concentrated and potent liver extracts for parenteral administration . . . the magnitude of the reticulocyte response is not directly proportional to the amount of potent material used, nor is the accompanying increase in the erythrocytes necessarily directly proportional to the rise in reticulocytes. Consequently, and because the primary object of treatment is to elevate the level of and improve the character of the erythrocytes, it would seem advisable to rely more on increases in the erythrocytes, as a means of determining the actual comparative effectiveness of the various substances used."

Recently Riddle (1940), analysing the results obtained in about 600 cases of pernicious anæmia, proposed the formula $I = 0{\cdot}78 - 0{\cdot}174\ Eo$, in which I is the average weekly increase in red cells during the first two weeks of treatment, and Eo is the red-cell count before treatment. According to Riddle the blood of a satisfactorily treated patient should show a red-cell count of 4,500,000 or more in from 6 to 8 weeks and during the first 2 weeks of treatment an average weekly erythrocyte increase according to the formula. Conversely a liver extract of unknown potency tested on a case of pernicious anæmia should be considered fully potent only when the rise in erythrocytes during the first 2 weeks of treatment equals or exceeds that expressed by the formula.

MATERIAL STUDIED

During the last 12 years approximately 200 patients suffering from pernicious anæmia have been treated at this hospital; in about 125 of these sufficient data relating to red-cell counts, reticulocyte counts and liver extracts employed, were available to enable us to make

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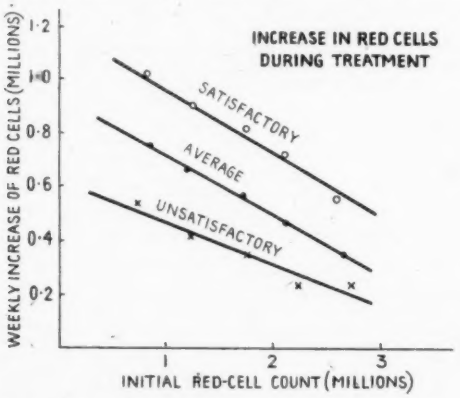
an analytical survey and to compare results with those obtained by other workers.

From the data available the average weekly increase in red cells during the first weeks of treatment has been calculated and plotted graphically. As Riddle (1940) and other workers point out, the increase of erythrocytes in a satisfactorily treated case of pernicious anæmia is not uniform, but is maximal during the first 2 or 3 weeks of treatment, thereafter becoming less and less the nearer the red-cell count approaches to normal. The increase



in the first 2 weeks of treatment was therefore selected for the calculation of the weekly increase.

At the same time the maximal reticulocyte response of each case was plotted graphically; it was soon noted that, with few exceptions, the cases under review gave a smaller reticulocyte response than that expected from Riddle's (1930) formula. Reticulocyte counts vary widely in the hands of different workers and these low responses may be due to differences in technique. It was noticed however that a high reticulocyte response did not occur in every case in which the blood count was restored to normal in 4–8 weeks, and which therefore might be considered to be satisfactorily treated. It was decided therefore to divide the cases into groups, not following Riddle's criterion of the magnitude of the reticulocyte response but taking into account only the increase in red cells during the first 2 or 3 weeks of treatment.

For each patient the erythrocyte count before treatment and the average weekly increase were located on graph paper as one point. On plotting all the points these were found to fall into three distinct groups which were empirically labelled: "satisfactory," "average," and "unsatisfactory." Next the points in each group were subdivided according to the initial red-cell count at 500,000 intervals (e.g., those falling between 500,000 and 1,000,000, between 1,000,000 and 1,500,000, and so on), and arithmetical averages were struck of the figures representing the points within each subdivision; these averages were plotted graphically (see figure) and for each of the three groups an equation was calculated expressing the relationship between initial red-cell count and weekly increment. As observed by various workers, the average weekly increase was found to bear an inverse relationship to the initial red-cell count. These equations are shown below, with the standard equations suggested by Riddle (1940), and those calculated from the figures of Isaacs and his colleagues (1938) and Murphy (1933).

Average	$I = 0{\cdot}93 - 0{\cdot}214\ Eo$
Satisfactory	$I = 1{\cdot}30 - 0{\cdot}274\ Eo$
Unsatisfactory	$I = 0{\cdot}63 - 0{\cdot}158\ Eo$
Riddle's satisfactory ..	$I = 0{\cdot}78 - 0{\cdot}174\ Eo$
,, unsatisfactory ..	$I = 0{\cdot}60 - 0{\cdot}176\ Eo$
Isaacs et al.	$I = 0{\cdot}87 - 0{\cdot}168\ Eo$
Murphy	$I = 1{\cdot}15 - 0{\cdot}235\ Eo$

The same procedure was adopted in plotting the averaged reticulocyte responses; the results are shown below. It is readily seen that the reticulocyte response of the average group is almost of the same magnitude as that of the satisfactory group, and that the unsatisfactory one gives responses only a few per cent. lower than the other two groups. Of the three groups of patients the average was found to be the most homogeneous, the standard deviation from the obtained formula being only ± 0·027 million. The standard deviation in the unsatisfactory group was ± 0·062 million, and in the satisfactory ± 0·090 million. In every group the red

Red-cell count before treatment (millions)	Reticulocytes %		
	Satisfactory	Average	Unsatisfactory
0·90[?]	18·8 ..	17·6 ..	16·7
1·26	18·6 ..	19·3 ..	16·1
1·73	16·4 ..	14·5 ..	9·2
2·33	6·6 ..	1·8 ..	7·4
2·66	7·8 ..	.. ..	6·2

cells reached 4,500,000 or more, but the time required to attain a normal count varied from group to group. The satisfactory group reached a normal level in 4–6 weeks, the average group in 6–8 and the unsatisfactory group in 8–12 weeks.

To show the responses to different extracts and the relationship between initial red-cell count and weekly increment, averages of the points are given for 4 different extracts (see table); these are grouped to show the satisfactory, average and unsatisfactory responses and the range of variation of the weekly red-cell rise.

The greatest number of cases falling in the unsatisfactory group were patients treated in the early days of liver treatment, or with test extracts found to be of low potency. In a few, although the preparation was of known potency and the dosage adequate, the erythrocyte count did not increase according to the average group formula; the patients nevertheless reached a normal blood-count, but in a longer period of time. No particular reason could be found to explain this behaviour. The formula $I = 0{\cdot}63 - 0{\cdot}158\ Eo$ given above for these unsatisfactory cases is very similar to that obtained by Riddle for his unsatisfactory cases, and that which can be calculated from the figures given by Schiødt (1939) for cases treated with oral preparations.

RED-CELL RESPONSE TO FOUR DIFFERENT LIVER EXTRACTS

Extract	Patients treated	Av. initial count *	Rise per week			Result
			Av.	Max.	Min.	
		Millions				
A	6	0·86	1·083	1·455	0·880	Satisfactory
	17	1·25	0·940	1·370	0·763	
	7	1·84	0·822	1·010	0·652	
	7	2·17	0·744	0·878	0·577	
	3	2·60	0·544	0·602	0·476	
	3	0·84	0·724	0·810	0·668	Average
	3	1·29	0·634	0·675	0·578	
	3	1·71	0·564	0·582	0·550	
	2	2·20	0·435	0·485	0·385	
	2	2·66	0·364	0·385	0·342	
	1	0·58	0·502	..	..	Unsatisfactory
	2	1·22	0·488	0·582	0·394	
	2	1·90	0·301	0·397	0·204	
	1	2·15	0·237	..	..	
	2	2·73	0·232	0·270	0·194	
B	3	0·90	0·994	1·060	0·960	Satisfactory
	3	1·31	0·995	1·350	0·785	
	3	1·62	0·906	1·130	0·653	
	1	2·78	0·602	..	..	
	1	0·80	0·780	..	..	Average
	5	1·22	0·658	0·770	0·581	
	2	1·78	0·565	0·605	0·525	
	1	2·00	0·545	..	..	
	2	0·79	0·593	0·652	0·534	Unsatisfactory
	2	1·34	0·417	0·448	0·385	
	3	1·72	0·424	0·435	0·413	
C	2	0·87	0·939	0·962	0·915	Satisfactory
	3	1·20	0·995	1·285	0·840	
	2	1·72	0·803	0·995	0·650	
	2	0·93	0·775	0·780	0·770	Average
	7	1·17	0·683	0·758	0·615	
	1	1·65	0·545	..	..	
	1	0·78	0·460	..	..	Unsatisfactory
	3	1·15	0·373	0·550	0·175	
	2	1·64	0·344	0·377	0·311	
D	5	1·34	1·002	1·205	0·826	Satisfactory
	1	1·83	0·660	..	..	
	1	2·55	0·590	..	..	
	1	1·13	0·632	..	..	Average
	5	1·30	0·416	0·467	0·310	Unsatisfactory
	3	1·71	0·374	0·420	0·325	
	1	2·30	0·240	..	..	

* Patients were divided according to initial red-cell count at 500,000 intervals.

The average group includes all those cases which responded well to liver treatment, and in which the blood-count was restored to normal in 6–8 weeks. The formula $I = 0{\cdot}93 - 0{\cdot}214$ Eo corresponds to that found by Riddle for his cases satisfactorily treated with intravenous injections, and is also very near those which can be calculated from the figures given by Isaacs and his colleagues and by Schiødt. This formula should be considered as representing a minimal increase of red cells under satisfactory treatment. In any case of supposed pernicious anæmia which at the end of 2 weeks fails to show the increase of red cells demanded by the formula the reason must be sought; this will probably turn out to be insufficient dosage due to low potency of the liver preparation; if this or some concomitant deficiency of other hæmopoietic factors (such as thyroxin or vitamin C) is not the cause it will indicate that the patient is suffering from a form of anæmia not amenable to liver.

The same formula can be used and is applied at this hospital for the assessment of potency of liver extracts; they are considered fully potent only when the injection of an adequate test dose produces in a patient suffering from pernicious anæmia a red-cell response equal to or higher than that indicated by the formula. In about half the cases observed in the pathological department, the red-cell response to a fully potent liver extract has been much higher than that expected from Riddle's formula, and a normal blood-count of 4,500,000 or more has been reached in a shorter time than in most of the cases reported in the literature. As stated above the formula obtained in these satisfactory cases is $I = 1{\cdot}30 - 0{\cdot}274$ Eo.

With the exception of those reported by Murphy, no published cases have been found giving a red-cell response as large as that observed in the present series. Murphy pointed out the unreliability of the reticulocyte response as a means of assessing the potency of liver extracts; he demonstrated that the increase of red cells may be great when the reticulocyte response is low, and that (as with the reticulocyte response) the increase of red cells is inversely proportional to the initial erythrocyte count. He did not, as was later done partially by Schiødt, and more accurately and completely by Riddle, work out a formula expressing this relationship. For comparison with the present series of cases, an equation, given above, has been calculated from the figures given by Murphy; this equation ($I = 1{\cdot}15 - 0{\cdot}235$ Eo) is in fact closely similar to that obtained from the satisfactory group. All other figures and formulæ found in published works, as pointed out above, approximate to the values obtained from the average, and in some cases to the unsatisfactory group. It is curious that the results obtained in the treatment of pernicious anæmia in this hospital should be better than those previously reported. This may be due to the employment only of liver extracts of known high potency.

SUMMARY

A series of 125 cases of pernicious anæmia has been reviewed and the relationship between the red-cell count before, and its increase during the first 2 weeks of treatment with parenteral liver extracts has been expressed by mathematical equations.

More than half the cases have been found to give a response to treatment better than was to be expected from previously published formulæ.

The reticulocyte response does not give an accurate indication of the effectiveness of liver treatment and is therefore not reliable by itself as a means of assessing the potency of liver extracts.

The formula $I = 0{\cdot}93 - 0{\cdot}214$ Eo (where I is the average weekly increase in red cells during the first 2 weeks of treatment, and Eo is the red-cell count before treatment) has been found to express a satisfactory response to treatment and is proposed as the standard equation for the assessment of the potency of liver extracts.

I wish to thank Dr. S. C. Dyke, for permission to use the case-records; also Dr. A. Liebetegger, for assistance in the mathematical analysis.

Dosage: DR. DYKE

Dr. Della Vida points out that only those liver extracts can be regarded as fully potent which, on the injection of an adequate test dose, produce a response satisfying his formula. This statement at once raises the question of the size of the adequate dose. It is evident that the actual bulk of such an adequate dose will depend upon the concentration of the antianæmic factor in the preparation used. Given two preparations, the first containing the factor in 5 times the strength of the second, the adequate dose of the first will be only $\frac{1}{5}$ the bulk of that of the second. Unfortunately it is at present impossible to assess the antianæmic factor in "units." An attempt at this has been made by the anti-anæmia preparations advisory board of the United States Pharmacopeia (1938) which has laid down that wording on labels or in package literature must give the information as to the daily dosage necessary to produce a "satisfactory hæmopoietic response" in a case of pernicious anæmia; this daily dose "constitutes a unit." The criterion of a "satisfactory hæmopoietic response" appears to be based on the expected reticulocyte responses calculated from the formula of Minot and his colleagues (1928), and on red cell production. A high reticulocyte response is usually the precursor of a satisfactory rise in the red cells, but this Dr. Della Vida points out is not always the case. It is therefore unsafe to use the reticulocyte response as a criterion of potency in assessing liver extracts. The rise of the red cells can alone be regarded as a true indication of potency.

This is not to say that observation of the reticulocytes should be dispensed with; for 3 to 6 days at least from the beginning of treatment the reticulocytes should be counted daily; absence of a response during that period serves as a safe indication that the preparation used is ineffective and that the observation can be discontinued. A high reticulocyte response, satisfying the formula of Minot and his colleagues, however, affords no certainty that the red cells will at the end of 2 weeks attain the figures called for by the formula of Riddle (1940), much less that of Della Vida, and in the face of such a response the observation of the red cells must be continued over the full period of 2 weeks.

In the cases forming the subject of Dr. Della Vida's calculations the actual dosage of liver extract has varied greatly. In the early days of the treatment it was the custom to give daily doses; later it was found that with fully potent preparations such frequent dosage was unnecessary. In this department a standard dosage of parenteral preparations has been established for the initiation of treatment; this consists of an initial dose of 4 c.cm. followed at equal intervals during the first week by two doses of 2 c.cm., and during the second week by a further dose of 2 c.cm.—a total of 10 c.cm. during the first 2 weeks. This works out as a daily dose over 14 days of 0·715 c.cm. and each 1 c.cm. of liver extract would therefore contain at least 1·4 USP units. In the absence however of any accurate knowledge as to the actual chemical nature of the antianæmic principle such pretence at accurate assessment appears misleading and likely to cloud the issue. It is preferable to dispense with units and to speak of the actual amount of a liver preparation required to produce a red-cell response according to an agreed formula. Experience suggests that for this purpose 10 c.cm. of a fully potent preparation given in the dosage mentioned above over the first 2 weeks of treatment is ample, and it follows that preparations failing to produce the expected red-cell response in this dosage must be regarded as not fully potent and their use as wasteful.

We now consider that after the first 2 weeks of treatment a dose of 6 c.cm. monthly should rapidly bring the red-cell count to normal. For maintenance we have found that most cases can be kept in remission on a dose of 4–6 c.cm. over a period of 2–3 months. This may be given divided at monthly intervals or as one injection every 2 or 3 months. This is below the dosage employed by many other workers (Wilkinson and Israëls 1942). We have found it impossible to establish a depot, no matter how much extract be injected, to last for more than 3 months.

I understand from the manufacturers of two of the preparations used in this department that 2 c.cm. of these represent 20–100 g. of raw liver; the same amount of concentrated liver extract prepared by Lederle in USA is stated to be derived from 200 g. of fresh liver (Kracke 1937). The use of unnecessarily large quantities of liver extract in the treatment of pernicious anæmia

may arise either from the employment of preparations of low potency or from ignorance of the potency of the preparation used; from whatever cause it arises it constitutes a waste of valuable material, undesirable at any time but now specially to be avoided.

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VITAMIN-C DEFICIENCY IN "IRRESPONSIVE" PERNICIOUS ANÆMIA

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SINCE the latter part of the winter of the present year we have been faced with the phenomenon of cases of pernicious anæmia proving wholly or relatively irresponsive to liver treatment. Various considerations led to the belief that this might be due to a deficiency of vitamin C. In certain of these cases the effect of the exhibition of ascorbic acid in full dosage has been such as to confirm this view. The following three are illustrative cases.

CASE-RECORDS

CASE 1.—Female, age 57. First treated at the Royal Hospital in October, 1937. Maintenance established on a dose of 2 c.cm. of a liver extract of known potency every month. In December, 1941, the patient noted that she was not so well; at this time her doctor was unable to procure further supplies of the liver preparation theretofore used and changed to another brand. In spite of greatly intensified dosage the patient's condition deteriorated steadily and trial was made of yet another preparation. The deterioration in general condition continued. When taken into hospital on May 3, 1942, the blood showed: Hb. 32%; red cells 1,230,000 per c.mm.; CI 1·3; reticulocytes 2/1,000.

Neither of the last two preparations of liver used had been tested in this department and it was thought that the failure to respond might have been due to their relative impotency; the patient was therefore treated with a preparation of known potency in dosage far exceeding that established as "standard" for this department (Della Vida 1942). This dosage produced only a slight and unsatisfactory reticulocyte response. Vitamin C in the form of 'Redoxon' (Roche) was then given in doses of 300 mg. daily. With continuation of the liver dosage the blood condition improved as shown in fig. 1. The patient is now well and a blood-count four weeks after admission showed: Hb. 80%; red cells 4,170,000.

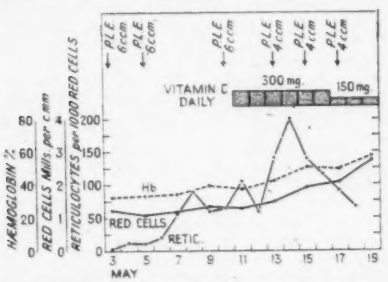

Fig. 1—Blood response to parenteral liver extract of known potency (PLE) and vitamin C.

CASE 2.—Female, age 67. On admission to the Royal Hospital blood showed the typical picture of pernicious anæmia: Hb. 49%; red cells 1,650,000; CI 1·48; CV 24%; MCV 145 c.μ; MD 8·6 μ; reticulocytes less than 1/1000; white cells 5400 (polymorphs 62%; lymphocytes 34%; monocytes 2%; eosins 2%). Shift to the right in the Arneth count; anisocytosis, poikilocytosis and basophilic stippling of the red cells. Van den Bergh reaction: faintly positive indirect. Fractional test-meal: no free HCl.

This seemed so definitely a case of pernicious anæmia that it was selected for assaying the potency of a batch of newly prepared liver extract not yet put on the market. To this

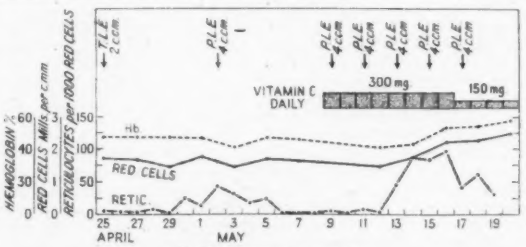

Fig. 2—Response in case 2.

there was no appreciable reticulocyte response and no rise in the red cells. In spite of the fact that preparations of liver from this particular firm had always proved highly efficient, this aroused suspicion as to the potency of this batch. As a test the patient was given the standard dosage of a liver extract of known potency. To this also the blood failed to make a satisfactory response. The effect of the exhibition of vitamin C in addition to the liver extract is shown in fig. 2. A month after discharge from hospital the blood picture shows: Hb. 73%; red cells 3,840,000; CI 0·95.

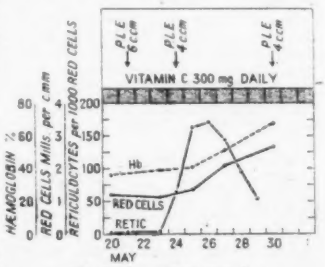

Fig. 3—Response in case 3.

CASE 3.—Male, age 69. First treated at the Royal Hospital in May, 1937. Maintenance dosage established at 4 c.cm. every eight weeks. At the beginning of 1941 the red-cell count dropped below 4,000,000 though the patient made no complaint of feeling ill. In March, 1942, the red cells were 2·5 millions and the patient's general condition was progressively deteriorating. The usual dose of liver extract did not stop the fall of the red-cell count. On admission to the hospital on May 20, 1942, the blood picture was: Hb. 36%; red cells 1,190,000; CI 1·51.

As shown in fig. 3, liver extract of known potency together with vitamin C rapidly restored the blood picture to normal. Five weeks after admission the blood count is: Hb. 82%; red cells 5,280,000; CI 0·78.

DISCUSSION

At the time that these patients were under observation—during the spring of the present year—a number of sufferers from pernicious anæmia attending at this department were found in spite of their usual maintenance dosage of liver to be showing a progressive fall in the red-cell count. After a month's course of vitamin C 100 mg. daily all these patients without any increase in their maintenance dose of liver extract showed a rapid increase of up to 1,000,000 red cells per c.mm. with corresponding improvement in the general health.

A study of the records of pernicious-anæmia patients attending the department reveals the hitherto unnoted fact that during the spring of 1941 and to a lesser extent that of 1940 a proportion of them showed a deterioration in the blood picture; after July the state of the blood tended to improve.

That the diet of our general population should be deficient in vitamin C during winter under war conditions was to be expected; that such actually has been the case has been demonstrated by Harris (1942) and Francis and Wormall (1942). The part played by vitamin C in hæmopoiesis is well recognised. The above observations serve to demonstrate that in pernicious anæmia, even with ample dosage of the antianæmic principle, hæmopoiesis cannot be returned to normal in the face of a deficiency of vitamin C. The implications of this observation both in the treatment of pernicious anæmia and in the testing of liver preparations for therapeutic use are of obvious importance.

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USE OF ETHYL CHLORIDE SPRAY IN SOFT-TISSUE INJURIES

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WITHIN the last few years several observers, including Kraus,[1] Creer,[2] and Cozen and Hollombe,[3] have mentioned the beneficial effects of cutaneous anæsthesia and active movements in acute muscular spasms and sprained joints. The results we have obtained with an ethyl-chloride spray in the treatment of lesions of this type have been striking.

While rest is indicated in the treatment of bony injuries and infections, it is likely that many, if not all, uncomplicated soft-tissue injuries are far better treated by active movement. Not only that, but in injuries of muscles and ligaments rest often leads to embarrassing sequelæ, such as the "frozen" shoulder that may result from rest treatment of trauma to the acromioclavicular ligaments. Ethyl chloride sprayed over the tender area of spasm or sprain is a simple anæsthetic agent that will in most cases permit active movement without too much discomfort. It is obviously simpler to apply than the injection method but it cannot replace injection treatment in deep-seated lesions such as are encountered in low back pain.

TECHNIQUE

This method is not advisable in cases of fracture, or torn ligaments or muscles of severe degree. To determine if a fracture is present an X ray should be taken. The most painful area is then ascertained from the patient and is sprayed with ethyl chloride till the skin is white. A full range of passive movement is then carried out when the patient quickly appreciates that the pain on movement is less. Occasionally it is found that one or more adjacent areas are painful on movement that were not originally recognised. These areas are sprayed in the same way until a complete range of active movement in the affected area is possible without pain. Too much anæsthetic must not be used, or frostbite may result. Attention must be given to the excess ethyl chloride which may accumulate in a dependent area and produce superficial necrosis of the skin. When a full range of movement is attained the area is treated with camphor liniment and massage until a good cutaneous circulation is restored.

During the application of the spray a more intense burning and painful sensation is felt than would be felt over a normal surface area treated in the same way. This burning sensation vanishes when the spray is stopped. A mottled, reddish discolorisation may remain for a time afterwards and be associated with mild itching. Tenderness over the affected area may persist for some days, but as a rule pain on movement is trivial.

The patient is told to carry out a full range of movement several times each day though the part should not be subjected to excessive strain. In mild cases only one application may be necessary but in more severe ones pain returns, range of movement diminishes and a second or third application may be required. Since active movement is the basic principle of this method, immobilisation by splint or strapping is definitely not to be employed. It is advisable to ask the patient to return on the first and third day after the initial treatment to ensure that the full range of movement is still present and that no untoward complication has arisen.

RESULTS

It is early yet to give a complete list of the conditions that might be treated in this manner, but experience so far has shown that acute traumatic lesions of the soft tissues, when not too extensive, give the best results. Within this group would be placed sprains, such as that of the ankle, finger, thumb, wrist, elbow, and acromioclavicular joint, and minor injuries about the knee. If there is delay before these conditions are treated the period of disability will be prolonged. Chronic lesions may also be improved but the results are not so striking. Late lesions of any of the above conditions, tenosynovitis, pain of indefinite origin and the like have shown remarkable improvement. If there is no noticeable response care should be taken that some other underlying condition has not been overlooked.

We have already treated 109 patients with the ethyl-chloride spray and active movements. They may be subdivided as follows.

Sprained ankle	33	Soft-tissue injuries about the elbow	5
Trauma to interphalangeal joints	25	Soft-tissue injuries about the wrist	3
Traumatic tenosynovitis	12	Soft-tissue injuries about the knee	4
Direct muscle trauma	10	Contusion of bone	4
Sprain of the acromioclavicular joint	7	Pain of indefinite origin	6

Ankle-joint.—By far the largest group have been sprains about the ankle-joint. Of these the majority have been about the external malleolus. Only 6 cases have had swelling about both the external and internal malleoli. Pain on movement, as would be expected, is on inversion and plantar flexion. The site of tenderness is usually anterior and inferior to the external malleolus. Less significance is paid to the localised tenderness than to the sites of localised pain in the treatment. The ecchymosis is more noticeable on the day after treatment and tends to be dependent. In a few cases the swelling has increased after treatment but as a rule within 24–48 hours the œdema is definitely less and may be entirely gone in 5–6 days. The treatment of sprains of the ankle-joint has proved the most satisfactory of all the conditions enumerated.

Interphalangeal joints.—For the most part the fingers rather than the toes have been treated. This group includes a few cases with injuries to the metacarpophalangeal joints as well. The areas treated are the lateral, medial and dorsal surfaces of the joint. The results have mostly been better than had been anticipated. Injuries in these areas are so prone to develop chronic swelling and limitation of movement that some change in the usual methods of treatment seems justifiable. It is our impression that there has resulted less fibrosis and periarticular swelling than follow the customary immobilisation.

Tenosynovitis.—This group includes traumas to the extensor and abductor pollicis longus, tendo achilles, tibialis posticus and the common extensors of the fingers and toes. Localised pain and tenderness when contraction of the particular muscle is made against resistance has been the chief sign in the diagnosis, together with a certain amount of swelling in some instances. In general these cases have done well.

Trauma to muscle.—These include contusions of the muscles of the back, thigh and calf with swelling, pain, limitation of function and occasionally ecchymosis. The treatment has been beneficial.

Sprain of acromioclavicular joint.—The acute cases without displacement of the clavicle have done well. Those that have a chronic condition, the result of a traumatic arthritis, have been improved.

Elbow.—This group includes not only sprains but also those cases with pain on extension referred to as "tennis-elbow." The sprains have been improved and the tennis-elbows have done extremely well.

Wrist.—Not many cases of this type have been treated and possibly some have been wrongly diagnosed as tenosynovitis. There has been improvement.

Knee.—Few cases have presented themselves. The bulk of traumas in this area result in a torn lateral ligament, ruptured meniscus or an effusion into the joint, none of which have been treated by this method. The few patients treated have been benefited.

Contusion of bone.—Patients who have had trauma to bone with residual pain have not been improved to any extent by cutaneous anæsthesia.

Pain of indefinite origin.—This group includes patients with vague pains in the back, neck or extremities, in which a definite diagnosis has not been made. The treatment has only been given when an X ray has proved negative and local and systemic examinations have failed to reveal underlying disease. In 4 instances the patients recovered; the result in the other 2 was indefinite.

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2. Creer, W. S. *Brit. J. phys. Med.* 1939, **2**, 50.
3. Cozen, L. and Hollombe, B. S. *Surgery*, 1940, **8**, 468.

DISCUSSION

Undoubtedly the most important feature of this method of treatment is the early use of active movement. As a result of the initial trauma local pain reflexly sets up muscle spasm to prevent movement and further pain. Through some mechanism not readily explainable the ethyl-chloride spray removes the pain which in turn diminishes the amount of muscle spasm and permits the muscle to function again. When this has been accomplished, with or without a second or third application of the spray, sufficient lymphatic circulation is started to remove the local traumatic œdema. On theoretical grounds one would expect an increase in the œdema on the early institution of active movement, and this does occasionally happen, particularly in sprained ankles. Its presence, however, is no indication to discontinue the treatment. The swelling may increase for 24–36 hours but then quickly disappears so that by the 5th or 6th day little if any œdema remains. The speedy and relatively complete diminution of the swelling not only allows a fuller range of movement but prevents the stagnation and chronic induration which leads eventually to periarticular fibrosis and limitation of movement.

Naturally the best results are with early and mild traumas, but quite severe lesions with extensive swelling and associated ecchymosis have also been enormously improved immediately and have recovered rapidly. It is unwise to treat fractures of bones and tears of major joint ligaments in this manner but fortunately the degree of anæsthesia obtained is not sufficient to permit of this being done.

Ready coöperation of the patient is a great help. We have found that soldiers may be returned to full duty in a minimum of time while during their period of light duty they have relatively little incapacity.

So far, by way of complications, there has been little beyond local irritation of the skin. There may, of course, be some cases of traumatic arthritis developing later owing to the early use of the part but it is too early for a definite judgment on this possibility.

SUMMARY

Local anæsthesia by the ethyl-chloride spray, followed by active movements, has been used in 109 cases of soft-tissue injuries.

The method is simple to apply and gives immediate relief and rapid recovery in a large proportion of cases.

FREEZING WITH ETHYL CHLORIDE TO RELIEVE PAIN AND LOSS OF MOVEMENT

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SOME five years ago I heard through a casual visitor from Vienna that the ethyl-chloride spray which we here employ mistrustfully for local anæsthesia there served to encourage patients in moving refractory fingers. Just then a waiter for whom we had opened a superficial whitlow returned with his index finger fully healed but so impotent that he was unable to carry a plate. It was clear that his case required nothing but encouragement, and I used the ethyl-chloride spray as auxiliary. Immediately after the freezing he was able to cross the room carrying a large kidney-dish filled with water between his thumb and the cold finger. This quick improvement I put down to the power of suggestion; then I forgot about the method for four years. My interest was revived suddenly by my friend, Dr. J. E. O'Loghlen, to whom I and many postgraduate students owe our first acquaintance with a variety of simple, effective expedients for everyday use. This time, however, the factor of suggestion seemed to fade into the background, while new factors, just as intangible, came to the fore. The following few notes are mere pointers, touching the fringe only of what has developed here in the hands of O'Loghlen.

One of the patients who did much to break down my own scepticism was an old lady we knew well. I had pinned her fractured neck of femur uneventfully. From the first week she had made full movements, but had borne weight on the injured hip only three months later. Nine months after operation she began to feel pain in the hip; an X ray showed flattening of the left femoral head. She was, we knew, a person of character who did not complain easily, and we failed entirely to relieve her: heat, Scott's dressing, 'Veganin,' traction did not help at all. At a loss, I froze a palm's width of skin in front of the left hip—freezing the skin three times and waiting, as we do, for the red reaction to show between first and second freezings. Within two minutes of the third freezing she said "There's a queer feeling going through the joint from front to back," an unusual thing for a "frozen" patient to remark, attention being focused more on the surface. Asked what kind it was, she said "a hot feeling." She also said that her pain had gone. We (for there were five witnesses) watched her move her hip, previously held motionless on account of pain, fully in every direction. But freezing does not change the shape of femoral heads, and after five days her pain returned. That, however, was the first break in her suffering.

This patient's remark about the hot feeling led us to look for a temperature change deep down in tissues under a skin area which had been frozen. Major Ruscoe Clarke and I made a personal test. A hollow needle containing a thermocouple was thrust into the right and left thigh. Each needle touched the outer side of the femur at the middle third and was then withdrawn ½ inch. When the mirror-galvanometer reached its zero point the skin in front of one needle was three times widely frozen, and erythema appeared, as is the rule. The experiment lasted 80 minutes and during that time the deep temperature did not change in the least.

An old naval rating injured his right shoulder and came to me with the diagnosis of probable rupture of the supraspinatus tendon. The sensitive points, however, when I saw him, were remote from that site, and maximum pain on pressure was over the tendon of teres major; X ray was negative. For six days he had been unable to abduct his right arm from his side. After freezing the skin over his shoulder (or rather after making it very cold, for no frost appeared) he was at once able to abduct the arm through 30°, and in a week, with a second freezing, he raised the limb well above his shoulder.

One of my younger colleagues hurt his wrist. A first X ray disclosed no fracture. He could not flex his fingers and his whole wrist was extremely painful. A deep hæmatoma showed faintly through the skin in front of the lower end of the radius. In the interval before the second X ray—hoping that it too would be negative and that I was dealing with a sprain—I froze a bracelet round the painful wrist. Within two minutes he was able to open and close his fist and move the hand and wrist painlessly in every direction. Complete relief lasted four hours; then pain and disability returned in full. The second X ray showed a crack in the articular surface of the scaphoid. Ten minutes after my colleague had gone a woman came with exactly the same painful inability to close her fist, and with an almost identical hæmatoma, but with a different fracture—a crack in the distal end of the radius. She, like my colleague, could close her hand and move her wrist as soon as the part had been thrice frozen. Her relief, unlike his, was lasting though slight pain recurred in five hours.

A secretary in a department of pathology, after wrenching her right wrist, found it impossible to do her typing. There was a tiny, tender thickening of extensor pollicis brevis beside Dupuytren's snuff-box, and we diagnosed her case as one of stenosing tenosynovitis. Later she found writing difficult; she was also quite unable to cut cloth with scissors, for stretching out her thumb caused distress. After freezing she could perform these acts painlessly during the next three or four hours; she even used the scissors to cut thick, folded wads of paper. We gave her this relief as often as she cared to come for freezing, and we subsequently cured her by de Quervain's operation, stripping the adherent and locally thickened synovial sheath round the tendons of abductor longus and extensor pollicis brevis.

In most of the cases I have treated by freezing—or sometimes by cooling, for striking relief can be got short of ice formation—pain or rigidity were in limbs or back. But a nurse suffering acutely during several months from pain in the left breast, which began before a menstrual period and lasted through its early phase, was completely

relieved for many hours each time the two tender spots on the breast were frozen. This helped us to tide her over till she got ease from a moulded support that carried the breast at the relevant time.

* * *

These are only a few examples of relief out of more than a hundred patients treated with ethyl chloride. Many painful conditions were completely cured. Some with low back pain who had not been able to move with comfort did so easily after being frozen. Others were glad of whatever relief they got—an old patient, for instance, with lumbar vertebræ like the sides of guttering candles, whose discomfort was checked by physiotherapy during the time only of its application, had relief with lumbar freezing for seven hours and came repeatedly to get it. Such relief of pain (apart from cure of its cause) by simple harmless means which can be tried again and again is, as a friend used to say, "not nothing."

My colleagues, I know, felt a robust dubiety, till they began to try the thing for themselves. Many, too, will picture these patients as objects of nothing more than suggestion enforced by a volatile jinnee from a bottle. And they will be wrong, as my last case proves. Here is a note written by her mistress, Dr. Meave Kenny. Blitz, a small dachshund, aged 7 months, "chased a six-wheel army lorry and was run over by same sustaining severe crushing injury of right paw but no other hurt. Was quite unable to set paw to ground, lay on side moaning and distressed. X rays showed that there was no fracture present; the paw and whole leg, however, were swollen, extremely tender and painful, causing the patient to drool copiously and weep. Four hours after the accident the paw was frozen. Relief was immediate. The patient, who at the start was non-coöperative and belligerent, affectionately saluted the surgeon, leapt off the couch and ran about the room on all paws with only the trace of a limp. About five hours later, the patient not having exercised much in the interval, complete lameness returned and pain again began. Further freezing led once more to complete relief. The slight residual limp and swelling vanished within the next four to five days. The patient will ever pray. . . ."

CASE OF STAPHYLOCOCCAL PNEUMONIA

RECOVERY WITH SULPHATHIAZOLE

JOHN GORDON, M A CAMB, M R C S
FLYING-OFFICER RAFVR

TRUE staphylococcal pneumonia is relatively uncommon, and with the recent introduction of sulphathiazole as a means of treatment a case that recovered seems worth recording.

At sick parade on the morning of March 31, 1942, an aircraftsman complained of pain behind the eyes, sore throat, cough and pains in the legs; his temperature was 102·6° F., pulse-rate 96 and respirations 24 per min. His throat was red, there were no abnormal physical signs in his chest, and he was admitted to the local isolation hospital as a case of influenza. There the local medical officer of health who examined him found no abnormal physical signs and ordered sulphapyridine 1 g. four-hourly. Thirty-six hours later the patient's temperature had dropped to 98° F. his pulse-rate to 86 and his respirations to 20, but on the third day his temperature again rose to 102·6° F. with a pulse-rate of 90 and respirations 24. His cough was worse, his sputum was tough and rusty, and there was dullness at the base of the right lung with many râles. The sulphapyridine was continued, a purgative was given as he had been constipated, and kaolin plasters applied to his chest. His temperature began to settle again, but his cough was still troublesome and he complained of tightness in the chest. On the seventh day he began to get dyspnœa, and the dullness and râles were present at the bases of both lungs. On April 7 his evening temperature was 100·4° F., his pulse-rate 120 and respirations 32; he was given oxygen and brandy. Next morning the temperature had risen to 102° F. with a blood-pressure of 140/50 mm. Hg, and as he was cyanosed, the sulphapyridine was discontinued and 1 c.cm. nikethamide was given three times a day with the oxygen and brandy. On April 10 his general condition was considerably worse, his blood-pressure was 125/50, and he was coughing up copious blood-stained sputum; the prognosis was exceedingly grave. Next day 5 c.cm. of soluble sulphapyridine was given intramuscularly at noon, followed by 1 g. of sulphapyridine by mouth every four hours. A bacteriological report on the sputum showed *Staphylococcus aureus*, with a few Pfeiffer's bacilli; the blood-picture was normal with no leucocytosis. On April 15 the man was even worse, his pulse, temperature, and respirations all began to rise, and as a supply of sulphathiazole was now available he was given 2 g. of the drug every four hours. Two days later he looked much better and his temperature had fallen, but he was still coughing up profuse amounts of sputum and was still cyanosed. Twice daily injections of atropine sulphate gr. 1/200 were given to relieve the congestion. By April 23 he was much improved, his blood-pressure was 112/80, and his white-cell count was 11,000 per c.mm. A throat swab still showed a pure culture of *Staph. aureus*. From this time he had a stormy convalescence, often running night temperatures, but his pulse remained fairly steady and his respiration-rate soon came down to within normal limits. On April 26 the sulphathiazole was discontinued and as it was now possible to move him he was X rayed; this still showed some consolidation at the bases of both lungs. He was given a simple expectorant mixture, and gradually improved until he was discharged from hospital on May 19, after fifty days' treatment.

The geographical position of the area from which I write made the return of bacteriological reports slow, and the sulphathiazole was some time in reaching us; hence the delay in starting sulphathiazole treatment.

Two points seem interesting in this case—first, the complete failure of sulphapyridine in combating the staphylococcal infection, and secondly the depressing effect this drug seemed to have on the leucocyte response. Sulphathiazole seemed to have an opposite effect, producing a well-marked improvement in forty-eight hours, and allowing the leucocytes to respond to the infection at once.

My thanks are due to Dr. R. Stevenson Doig, medical officer of health of this area, for allowing me to publish details of the case.

Reviews of Books

The March of Medicine, 1941

By various authors. New York: Columbia University Press; London: Humphrey Milford, Oxford University Press. Pp. 154. 13*s*. 6*d*.

THE sixth series of lectures for the laity, delivered annually at the New York Academy of Medicine and subsequently published under this title, is well up to standard. Of this year's set three might be described as thoughtful, two informative and one historical. Writing one of the first group Dr. Alan Gregg reminds us that science is limited in that it does not give us tastes or values; for these things we must look to humanism to enable us "to counterbalance the exultations and threats of the specialists"; only thus can we become properly educated. Dr. William Healey argues that a knowledge of psychiatry would teach the normal man more about himself and so help him in his social relationships. Dr. Irwin Edman—a doctor of philosophy, not of medicine—wants physicians also to be philosophers, but can they help being so? On the purely informative side Dr. Oscar Riddle outlines the potentialities of endocrinology and Dr. Francis Carter Wood does something to dispel the all too widespread notion that we know nothing about cancer. Dr. Henry Sigerist's lecture on Paracelsus paints a sympathetic and understanding picture of that uncouth genius.

The Pleuro-Subpleural Zone

J. SKLADAL, reader in general and experimental pathology, Caroline University, Prague. London: Cambridge University Press. Pp. 103. 10*s*. 6*d*.

THE publication of this monograph, delayed by the German occupation of Czechoslovakia, is the outcome of some ten years clinical and experimental research into the properties of the pulmonary expiratory sound and their implications in the diagnosis of various cortico-pleural lesions of the lung. Dr. Skladal first noted, while studying the origin of isolated superficial râles, that if the coughing ordinarily used to elicit them is replaced by a sudden expiration a double expiratory

sound may sometimes be heard. This second sound may have two distinct characteristics: (1) reduplication (shortly after the sound usually heard in expiration there follows a second sound which may be similar to the first or acoustically more prominent and tubular); (2) triple sound or pulmonary gallop rhythm (three successive sounds—two comprising the reduplication already described, and another sound, less intense than the second, following it without interruption). Metrically expressed the reduplication is iambic and the triple sound anapæstic. Dr. Skladal has studied the physics of these sounds by means of various instruments. The double sound was reproduced on gramophone records and analysed by oscillographs made from gramophone discs as well as from direct recordings and by Fleisch's aerotachograph which registers the speed of the air column. The expiratory output was studied with the manometric mask of Pech and the volume of the expired air with a spirometer. Lastly, a bellows model was constructed to reproduce the expiratory sounds. By means of these experiments he was able to confirm his auscultatory observations, and could explore the clinical and radiological signs of corticopleural lesions of the lungs. These included visceropleural thickening and lesions of the subpleural areas of the lungs, such as atelectasis, fibrosis and "splenopneumonia" (used to denote a relatively benign form of pneumonia with a sero-albuminous exudate in the alveoli and physical signs resembling those of a pleural effusion). The true corticopleural syndrome, as he describes it in association with his characteristic auscultatory sign, is a thickened pleura with a consolidated cortical parenchyma beneath, whether produced by œdema, sclerosis, congestion or inflammation. Radiologically the lesions are characterised by a cortical radio-opacity, likened to "sugar icing on cakes"; several examples are reproduced. A pseudo-cortical syndrome is also described, caused by simultaneous lesions of the cortical border and the deep portions of the lung. Dr. Skladal has evidently taken immense pains in collecting his facts and in checking them by laboratory experiment; the result is a closely reasoned and scholarly study.

Thoracic Surgery

CHARLES W. LESTER, MD, FACS, assistant clinical professor of surgery, New York University. London: Humphrey Milford, Oxford University Press. Pp. 141. 12*s.* 6*d.*

FOR those students of thoracic surgery who like their facts in highly tabulated form this small book will be welcome. Each chapter consists solely of classified and numbered sections and subsections with some appended references. The few sentences of more than a word or two indicate the views of Professor Lester himself; and the average reader may well regret that these have not been elaborated to the exclusion of some of the baldly stated and less important facts. The subject matter is as up to date as could be wished. The surgeon with ambitious designs on carcinoma of the lung or œsophagus will find the possible procedures detailed for him. The same applies to recently developed operations on the heart for coronary thrombosis or patent ductus arteriosus. The book is interleaved with blank sheets which invite notes or illustrations.

Voles, Mice, and Lemmings

Problems in Population Dynamics. CHARLES ELTON, director of the Bureau of Animal Population, Oxford. London: Humphrey Milford, Oxford University Press. Pp. 496. 30*s.*

THE interrelationship between man and the lower animals is apparent in many fields of life. The medical aspect of this relationship is important to the profession, but it is as well to be reminded occasionally of the profound influence of the animal kingdom on man's economic and social well-being. The first part of Elton's book is historical, dealing with vole and mouse plagues throughout the world from the Pentateuch to the present time. The earlier plagues make fascinating reading but are less scientifically satisfying than those of more recent date. The second part of the book deals with the fluctuations in density of voles and mice in Great Britain and Scandinavia. The work of Elton and his colleagues in the Bureau is described. Their methods of approach to ecological and epidemiological problems entail the measurement of fluctuations and density of population by means of various census operations; attempts to discover controlling causes in different environments by assessing breeding, mortality and movements in their framework of landscape, vegetation, climate and animal associates; an intelligence system for following the vole population cycle in the field; a staff of ecologists to organise the collection of material at the crucial time; a stock of laboratory-bred voles for experiments; and pathological investigations. Elton also discusses the effect, in northern Canada, of the density of the mouse population on fur-bearing animals and thus on man; mice are the main food of the foxes, it seems, and thus density of fur-bearing population follows the density of mouse population; so that man's chief occupation in that part of the world depends ultimately on the number of mice about. The field covered in this book is a vast one, since an immense number of questions await elucidation; but here at least is a scholarly attempt to define the problem.

Aids to Surgery

(7th ed.) CECIL JOLL, MS Lond, MD Brist, FRCS; REGINALD C. LEDLIE, MB Lond, FRCS. London: Baillière, Tindall and Cox. Pp. 654. 10*s.*

ATTEMPTS to compress the surgical knowledge required for examination purposes must of necessity result in a book which, though containing sufficient information, fails to convey the broad principles of surgical teaching; but for a concise work to read in conjunction with one of the longer textbooks, this little book will supply a demand. Brevity and tabulation, especially in the paragraphs on treatment, may sometimes give erroneous impressions; for instance, incision, heat, passive hyperæmia, serum and general measures are prescribed, in that order, for cases of acute cellulitis, and the accepted principle of delaying the knife in this disease is not mentioned. Amputation "at the lowest point at which vessels can be felt to pulsate" is recommended for those cases of senile gangrene which require operation; this seems drastic, and if practised will lead to many disarticulations at the hip. The incision described for cases of flexor sheath suppuration of the thumb extends too far proximally, and would divide the motor branch of the median nerve. On the whole, however, the book is informative and accurate. Abdominal surgery is well described and space is given to alternative methods of treatment. The section dealing with injuries has been condensed, as the authors state, from Watson-Jones's textbook on fractures, and obsolete methods which still linger in many surgical textbooks have been omitted.

Essentials of Electrocardiography

(2nd ed.) RICHARD ASHMAN, PhD; EDGAR HULL. London and New York: Macmillan. Pp. 373. 21*s.*

THE authors, who hold the chairs of physiology and medicine respectively at New Orleans, write clearly and the student should have no difficulty in grasping the essentials of electrocardiography from their book. A full description of the theoretical basis will be valued by those interested, but since this aspect of the subject is still largely hypothetical it may be omitted by those who are not. Just the right number of tracings are reproduced to balance the text. The common abnormalities of the cardiogram are first described according to topography and in a later chapter in relation to ætiology. The recent work incorporated in the book has been well selected.

Dictionary of Scientific Terms

(2nd ed.) C. M. BEADNELL, MRCS, FZS. London: Watts and Co. Pp. 232. 2*s.*

ANYONE who reads much modern scientific work must inevitably, from time to time, meet words unknown to him, and inadequately defined or not to be found in an ordinary dictionary. To give some help in this difficulty Admiral Beadnell has compiled this pocket dictionary. It will seldom be found wanting, and the ingenuity and terseness of the explanatory information are impressive. It is rather terrifying that the growth of science should have minted such various and often monstrous coinages to express its ideas, especially since each new advance makes still more new coinages necessary and at the same time banishes many previous terms from circulation! Thus much of the vocabulary at present in vogue is likely to be incomprehensible to future generations.

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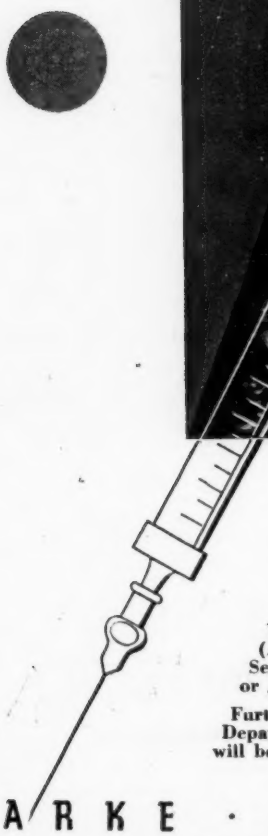

The ideal time for commencing prophylaxis against "colds" is during September. Three graduated doses, with an interval of from 7 to 10 days between each, are recommended. The vaccine especially designed for the purpose is "ANTI-CATARRH VACCINE," containing *M. catarrhalis*, with *Pneumococcus*, *B. pneumoniae*, *B. septus*, *B. Influenzae*, and *Streptococcus*.

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Further particulars of the above vaccines, which are prepared in the Department for Therapeutic Inoculation, St. Mary's Hospital, London, W., will be supplied on request.

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THE LANCET

LONDON: SATURDAY, SEPTEMBER 5, 1942

HOW AND WHY INFANTS DIE

DESPITE the cock-a-hooping of the Minister of Health there is an undercurrent of dissatisfaction with our infantile mortality. This was manifest in our correspondence columns following a recent study [1] by MCNEIL of death in the first month and the first year of life. Neonatal mortality has here as elsewhere, with the notable exception of Chicago, been unamenable to any direct effort to abate it, and England (and still more Scotland) makes a poor showing against Holland, Sweden, Switzerland and Australasia in the death-rate of the rest of the first year. MCNEIL'S thesis is that this excessive rate, now on the increase, is due to serious defects in our nursing and medical control of the baby after birth: defects which, he is convinced, can be put right by teaching and training.[2] The first requisite is to be sure of the facts, and it is the particular merit of an inquiry by SPENCE and MILLER into a year's infant deaths in a northern city that they were not content with an analysis of the certified causes of death but devised a critical and personal form of investigation. Every such death was reported to them by the local registrar within 24 hours of its registration and themselves possessing clinical experience of disease in infancy they were able to enlist the willing coöperation of all the certifying practitioners in the city. The investigation was preceded by a meeting at which its objectives and methods were discussed and decided. But even so there were gaps in the inquiry. In only 54 out of the 272 deaths was an autopsy done and then not always by a trained pathologist, and only 19 were in the neonatal period. And almost half of these examinations failed to establish the cause of death. The more or less definite labels on the registrar's certificates, when revised in the light of informed ignorance, found their way into (1) a group called birth-deaths in which the exact cause of death was not stated, it might have been asphyxia, intracranial hæmorrhage or infection; (2) a group called infection of unknown origin; (3) a group of cases in which no opinion could be given; (4) a group of deaths *apparently* due to prematurity alone. These four groups numbered 38, 32, 41, 47, making an aggregate of 158 out of a total of 272. MILLER assumes the reader's knowledge of this inquiry in his article on death-certification in infancy which appears at the front of the present issue. He begins by welcoming the new liberty given in 1940 to the certifier of stating what *started* the baby's illness rather than the incident which carried it off. This change of outlook in the Newcastle series would mean many more deaths ascribed to the effects of birth and many more also to gastro-enteritis—pointing helpfully to "defects which can be put right" rather than to the prematurity which can only be lived down. Seven children dying unhelpfully of "congenital debility" had in a stricter review succumbed to birth injuries (3), infective causes (2), extreme prematurity (1), leaving one unfortunate who had just passed out without giving a clue. Asphyxia or atelectasis, on closer examination, all implied some trauma or accident during delivery, often being the sign of intracranial bleeding. MILLER shows good cause indeed for a revision of classification by a committee of clinical pædiatricians and a special form of certificate to include such additional data as birth-weight, feeding and position of child in family.

Although the Newcastle inquiry does not emphasise the importance of the first month, it is then that the problems of prematurity and breast-feeding can be best dealt with, and that the techniques against infection can be learned. It is then that the problems common to obstetrics and pædiatrics can be studied. We badly need some conjoint investigations here: obstetrician, pædiatrician, pathologist and physiologist. It will require team work of a high order to bring the major problems of prematurity, stillbirth, and neonatal death under searching examination. The first month is the beginning of pædiatrics, and very few pædiatricians have any clinical experience of it. Midwives are quite inadequately instructed in its pædiatric problems and say goodbye to the baby early in the second week; there is no proper liaison with the health visitor, whose instruction and training in dealing with the baby at this time are very poor. The newly qualified doctor has heard little or nothing about the baby in the first month. Without study, there can be no teaching; without teaching, nursing and medical practice are bound to be mismanaged. Moreover in the new Maternity Services Act there is no specific provision for the expert pædiatric control of the baby in these first dangerous weeks after birth; there is in fact no pædiatrician on the Central Midwives Board. A beginning might be made in some of the large centres where pædiatricians intimate with hospital neonatal problems could be used in domiciliary maternity practice. It would be as unfair as it would be idle to blame town councils or child welfare services for the present state of infant health; it is a big and difficult problem and the first essential for its control is study. Perhaps the chief service of the Newcastle inquiry will have been to show how little we know about these problems. Further studies of the kind in all large centres where there are pædiatricians capable of giving them skilled direction should count as war emergency. The last war initiated the antenatal and the postnatal clinic. There is a gap between them still to be bridged.

1. McNeil, C. *Lancet*, 1940, i, 819, 869, 912, 993.
2. *Brit. med. J.* 1942, i, 429.

ANÆSTHESIA FOR THE BELLY WOUND

FROM the anæsthetist's point of view total war has divided the wounded into two classes—those in the cities where facilities for modern anæsthesia are available, and those on the battlefield where apparatus is necessarily minimal. To assert that modern methods of anæsthesia have no advantage over the rag-and-bottle is to deny the improved results and safety of the modern major abdominal operation. The older surgeons were no less skilled, they too preached and practised careful preoperative treatment, but who would deny the now nearly negligible mortality of an operation such as partial gastrectomy, the very fit patient at the end of the operation and a convalescence in which, as LAHEY says, the rôle of the surgeon is but that of the "innocent bystander"? Seven

years ago LAHEY'S [1] mortality for radical partial gastrectomy was 18%, now it is less than 1% (1 death, from pulmonary embolus, in 154 operations), and he hands the credit for the fall to the improvements in anæsthesia. To fail to apply these principles to the treatment of the wounded abdomen would be irrational. But that does not mean that one "standard" type of anæsthesia is to be employed for every abdominal operation.

LAHEY and many surgeons in Britain use light or heavy spinal anæsthesia for their abdominal operations. Colonel J. DAVIS,[2] writing in the *Military Surgeon*, and STORCK,[3] who took part in a special American panel discussion on abdominal trauma, regard spinal anæsthesia as the most suitable for the wounded abdomen. Few in this country will, however, countenance this in the presence of shock, and GORDON-TAYLOR [4] goes as far as to say: "Spinal anæsthesia spells certain euthanasia for the shocked abdomen." The work of O'SHAUGHNESSY and SLOME [5] is often quoted in support of spinal anæsthesia, for they showed that in the experimental fractured femur of cats shock could be delayed or favourably influenced by this procedure, but they made a special point of stressing that it was dangerous to apply this reasoning to all types of shock, and especially that following trauma of the intestines. It is also dangerous to argue that the fall of blood-pressure in spinal anæsthesia does not matter and may be checked by suitable injection. In the unshocked patient the fall does not produce, nor is it associated with, any reduction in the circulating blood-volume.[6] But in shock the transport available to carry oxygen to the vital centres is reduced and the pallor, coldness and generalised vasoconstriction are all part of Nature's rationing scheme. Forcibly to dilate unimportant blood-vessels with a spinal anæsthetic is sabotage of the transport system. JULIAN SMITH,[7] writing of his Libyan experiences, pointed out that a large vessel, usually in the mesentery, is almost invariably severed in the wounded abdomen. The anæsthetist should constantly visualise this large vessel, for the time to operate is often left to his decision.

To delay anæsthesia in the abdominal wound in the hope that shock will improve with time is a form of wishful thinking that still needs checking. The vital centres are damaged early, and unless the bleeding is stopped early resuscitation measures will not catch up. That hæmorrhage is one of the most important factors in the production of abdominal wound shock is shown by comparison with other abdominal injuries. The patient with a stab wound, with severed bowel only, usually looks quite fit; the man with a ruptured bowel, with no penetration of the abdominal wall and no vessel damage, shows for several hours little alteration in pulse or blood-pressure—as MASSIE [8] and ESTES [9] have pointed out, there is a striking absence of symptoms indicating mortal injury for two hours. The importance of early operation for the wounded abdomen has also been urged by Russian surgeons. Following the work of VISHNEVSKIY [10] they maintain that with local anæsthesia operation can be started even while the patient is in a state of shock, and PSHENICHNIKOV of Moscow [11] even says that as the mesentery is being injected the shock passes off. Using two operating-tables they noted a striking difference between those under general and local anæsthesia. They used 0·25% procaine (sodium chloride 5, calcium chloride 0·125, potassium chloride 0·075, procaine 2·5, distilled water 1000 parts). After local infiltration and generously saturating both recti, the abdomen was opened and the parietal peritoneal surfaces widely infiltrated. A presenting intestinal loop was then pulled out, the mesentery injected and the infiltration gradually advanced so as to bathe the entire mesentery root in procaine solution. For the upper abdomen infiltration of the mesocolon down to its base was also necessary. The abdomen was thus absolutely relaxed, and a full laparotomy and intestinal suture took from 40 minutes to an hour; no ileus was observed, and since the patients were conscious their subsequent evacuation was not held up. Blood-transfusions were given in many of the cases, and intravenous glucose was used postoperatively.

Local infiltration anæsthesia, often combined with a splanchnic block, is used by many surgeons, but most British surgeons also have the patient asleep. Almost every general anæsthetic carries some danger or disadvantage, but consideration of the psychological make-up of the shocked patient is an important part of treatment. The average Englishman prefers, and as a rule demands, to be unconscious for what is otherwise an ordeal to him and even to the surgeon. The great advantage of the local anæsthetic is that it permits of the lightest possible plane of narcosis; this is especially important on the battlefield where orderlies, and even the padre, have had to be coöpted. In the city battle zone, cyclopropane, with which oxygen percentages of 75–90% can be given, is widely preferred as the complementary anæsthetic; it is now readily obtainable but its administration is probably best left to the skilled anæsthetist. Nitrous oxide with oxygen is usually quoted as the safest anæsthetic, and for that reason is often picked by the not so expert. But it is almost impossible to maintain unconsciousness with it without suboxygenating the patient, and in shock maintained anoxia is particularly dangerous. There may be little indication of this oxygen lack, for if there has been hæmorrhage and the hæmoglobin is below 50% no external cyanosis will be observed. Ether has shown the greatest safety in the greatest number of hands providing it is used for narcosis and not for relaxation. With the abdominal wall relaxed by local injection, the intravenous barbiturates have much in their favour and anæsthesia may well be started by injecting one of these into the rubber tube delivering a blood-transfusion. MALLINSON,[12] who has investigated casualty anæsthesia in the EMS, finds that with intravenous barbiturates "shock is not a contra-indication; properly administered, in fact, the reverse is outstandingly clear." Local anæsthesia has one possible disadvantage, important these days with the

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5. O'Shaughnessy, L. and Slome, D. *Brit. J. Surg.* 1935, **22**, 589.
6. Schuberth, O. D. *Acta chir. Scand.* (Suppl. 43) 1936, **78**, 10.
7. Smith, J. *Aust. N.Z.J. Surg.* 1942, **11**, 153.
8. Massie, G. *Lancet*, 1923, ii, 643.
9. Estes, W. L. *Surg. Gynec. Obstet.* 1942, **74**, 419.
10. Vishnevskiy, A. V. *Soviet Med.* 1941, **8**, 10.
11. Pshenichnikov, V. I. *Ibid*, p. 16.
12. Mallinson, F. B. *Brit. J. Anæs.* 1941, **17**, 92.

extensive use of local sulphonamides. WOODS [13] has shown that, in vitro, procaine is a potent inhibitor of sulphonamide activity. The rapid absorption of the local anæsthetic, the fact that it is really placed in the abdominal or mesentery layer and not in the cavity itself probably discounts any such action, but no experimental work on this aspect has yet been recorded. Finally, there is a tendency to regard the abdominal wounded as hopeless and the time as better spent in attending to other casualties. Some belly wounds by the nature of the injury must be mortal, but GORDON-TAYLOR [14] has reviewed a series of over 600 cases that reached the operating-table, and half of these survived. That makes abdominal surgery worth while.

SULPHONAMIDE-RESISTANCE

THE development of resistance to sulphonamides is dramatically illustrated by a case reported from Cincinnati, where the subject has been given much attention by SCHMIDT, SESLER and others.[15] A patient suffering from pneumococcal endocarditis was treated by repeated courses of sulphapyrazine. At first the organism was quite sensitive to the compound in vitro and the patient responded definitely, though temporarily, to each course; but the organism's resistance gradually increased, as shown by in-vitro tests, until eventually it resisted high concentrations of the drug and no further clinical response to the treatment could be obtained. The history shows the course of events when an organism is maintained in long but ineffective contact with a sulphonamide compound. This phenomenon forms a close parallel to the well-known development of arsenical resistance in the trypanosomes of African patients treated unsuccessfully with tryparsamide.

Besides its theoretical interest drug-resistance is obviously of great clinical importance.[16] It has been described in streptococci, pneumococci and gonococci, and it may be expected to develop in any organism which is initially sensitive to sulphonamides. When it occurs, it extends to all compounds of the group, although an organism which resists the weaker bacteriostatic action of sulphanilamide may sometimes succumb to a more active substance such as sulphathiazole; on the other hand, the resistance does not extend to bacteriostatic compounds of a different type such as penicillin or gramicidin.[17] It is not known with certainty how quickly resistance may develop in clinical practice, but the laboratory evidence suggests that development may be rapid. Thus when pneumococci were passed through mice treated with insufficient doses of sulphapyridine resistance was much increased after 7–15 days, and after 13–23 days it was maximal; when pneumococci were cultured in weak concentrations of the same compound in-vitro resistance was raised within 80 hours.[18] In the case of endocarditis referred to the first serious increase of resistance took place between the 31st and 71st days, and according to HAMBURGER and his colleagues there is less hazard of resistance developing during short intensive treatment such as is given for lobar pneumonia. FRISCH [19] reports that strains of pneumococci isolated from patients after chemotherapeutic treatment were definitely more resistant than those isolated before it; this might be due either to the weeding out of sensitive strains or to an acquired resistance. FRANCIS [17] has recorded a minor epidemic caused by a sulphanilamide-resistant strain of streptococci in a plastic-surgery ward. There was no evidence to show whether the resistance of this strain was spontaneous or acquired during treatment, but the conditions of a wound dressed daily with sulphanilamide, which often diminishes the infection without destroying it completely, are clearly favourable to the development of resistance. To prevent the spread of such resistant organisms a rigid dressing technique is essential.

Once a strain has become maximally resistant it can maintain its resistance for long periods [20]—SCHMIDT and others [18] found that it was not diminished by passage through 200 mice or by repeated subcultures in vitro—so that the same lack of clinical response may be expected in all the patients who have become infected, directly or indirectly, from the original source. There is some evidence that sulphonamide-resistant pneumococci persist in the nose and throat of patients as long as four months after the clinical cure of pneumonia. It seems possible, however, that strains which are only partially resistant may revert to their original sensitivity. Some of the sulphonamide compounds are more apt to provoke resistance than others. Sulphanilamide does so most readily, sulphapyridine less readily, while sulphathiazole is the least liable of the three.[20] It may be that streptococci become resistant less readily than pneumococci, on which most of the work to date has been done. When sulphonamide-resistance does occur it is important to recognise it at an early stage, so that the patient is not uselessly subjected to the toxic effects of further sulphonamide treatment. The primary indication will be the absence of the expected clinical response, but when resistance is suspected it may be confirmed by various procedures—e.g., a culture of the organism (streptococcus) may be smeared across a plate, part of which contains sulphanilamide,[17] or the sputum from a case of pneumonia may be injected intraperitoneally into mice treated with sulphapyridine and into control untreated mice, the presence or absence of resistance being shown within 18 hours by the rate of multiplication of the organisms in the peritoneal exudate.[21] When resistance has thus been confirmed it is useless to continue with the sulphonamides, and other measures have to be adopted. In cases in which resistance is not initially present every effort should be made to avoid producing it by faulty therapy. Small ineffective doses should be eschewed and intensive courses of treatment given from the beginning (with due precautions against urinary blockage); if the expected response is not obtained in a few days the treatment should be discontinued. Treatment continued over a long period, besides being responsible for most of the toxic manifestations, will almost certainly produce drug-resistance. The nature of the change which underlies drug-resistance is obscure. The morphology, cultural characteristics and virulence of the

13. Woods, D. D. *Brit. J. exp. Path.* 1940, **21**, 74.
14. Gordon-Taylor, G. *Surg. Gynec. Obstet.* 1942, **74**, 375.
15. Hamburger, M. jun., Schmidt, L. H., Ruegsegger, J. M., Sesler, C. L. and Grupen, E. S. *J. Amer. med. Ass.* 1942, **119**, 409.
16. See *Lancet*, 1942, i, 596.
17. Francis, A. E. *Ibid*, 1942, i, 408.
18. Schmidt, L. H., Sesler, C. and Dettwiler, H. A. *J. Pharmacol.* 1942, **74**, 175.
19. Frisch, A. W. *J. Bact.* 1942, **43**, 72.
20. Carpenter, C. M., Charles, R., and Allison, S. D. *Proc. Soc. exp. Biol. NY.* 1941, **48**, 476; Sesler, C. L. and Schmidt, L. H. *J. Bact.* 1942, **43**, 73.
21. Moore, F. J., Thomas, R. E. and Hoyt, A. *J. Amer. med. Ass.* 1941, **117**, 437.

organisms are usually unchanged. Arsenical resistance of trypanosomes is apparently due to a diminished affinity of the parasite for the drug, but in the case of bacteria there is still no evidence for an explanation along these lines, and it seems probable that the phenomenon is somehow related to *p*-aminobenzoic acid. Too gloomy a view should not be taken of the difficulties which sulphonamide-resistance may cause. Although examples are now more often reported, the great majority of streptococcal, pneumococcal and gonococcal infections still respond to sulphonamides. Some fear that all the strains of these organisms will eventually be made resistant, but acquired arsenical resistance has not yet progressed far in Africa. And even if sulphonamide-resistance does eventually become widespread the recent work in Oxford [22] suggests that by then we shall have other weapons in our hand.

Annotations

THE NF IS DEAD

THE Ministry of Health reminds us that the National Formulary was superseded by the National War Formulary on Dec. 1, 1941. Apparently some practitioners are still prescribing mixtures from the NF for their insured patients with consequent inconvenience to patient and pharmacist, and often wastage of drugs which are scarce. The ministry urges doctors when prescribing medicines by title alone to use those titles included in the BP, BPC or NWF but no others.

NUTRITIONAL SURVEYS IN INDIA

IT is a relief to turn from the accounts of India in the daily press and take up Memoir 34 of the *Indian Journal of Medical Research*. This deals with a series of investigations carried out in India by Dr. D. C. Wilson between 1936 and 1940. The diets of Indian communities in Kashmir, the Himalayan foothills, the Punjab, Hyderabad (Deccan), the Central Provinces and Orissa were investigated. These areas were chosen partly because they were centres of considerable nutritional disease and partly because they were representative of the great rice, wheat or millet eating areas of the country. The heights, weights, teeth and physical condition of thousands of Indian children in the same areas were examined at the same time. Subsidiary studies were also made of the health of the inmates of various jails and of leper asylums. Of the many facts of outstanding interest brought to light, one of the most arresting is that Indian children seem to be both shorter and lighter at all ages than their English or American fellows. Among the Indian children themselves the Hindus tended to be both shorter and lighter than the Moslems or Sikhs. One wonders whether these differences would disappear if all the diets could be equalised from birth. The diets of all the poorer Indian communities fall short of the standards set up by the League of Nations, and it was found also that, as in this country, poverty is the great obstacle to an adequate diet. Contrary to common belief, income rather than religion determines what an Indian shall eat. An interesting point is made that localities in which wheat can be grown are also favourable for the production of other valuable foods such as milk, and it is to these rather than to the staple cereal that differences in physique are likely to be due. Comparisons were made of the incidence of rickets and osteomalacia in communities with very similar diets, and the great differences are attributed to the exposure or otherwise of the body to sunlight. It will be chastening to some who flatter themselves that they are hard workers to brood on the amount of travelling and trying work which the collection of these data must have involved. It is pleasant also to ponder over the personal and private Anglo-Indian goodwill which made it all possible. Those who know anything about dietary surveys, however, will realise that the field work was only the beginning. The analysis and presentation of the data, which seems to have been carried out by Miss Widdowson, PhD, must have been as great a task, though an unostentatious one.

22. See *Lancet*, Aug. 15, p. 189.

SCHOOL CLOSURE FOR INFECTIOUS DISEASE

A MEMORANDUM [1] issued jointly by the Ministry of Health and the Board of Education says in big type: "The principle relating to the closure of schools enunciated in the memorandum, that it is only in special and quite exceptional circumstances necessary to close a school in the interests of public health, still holds good." After years of controversy this principle has at last been established. One of the first steps towards this end was the Woolwich inquiry which was planned in 1902 to last for five years. The utmost possible school closure was followed in the eastern half of the borough and class closure only in the western half. After some years Dr. S. Davies reported that while more cases were notified in the non-closure districts, closure had no appreciable effect on the age-incidence and that the death-rates in both districts were about equal. He concluded his report in 1906: "There is no doubt that in a large proportion of cases the infection of measles is contracted at school, and brought by children attending school to the younger members of the family not attending, among whom measles is so fatal. Now, obviously, if the age of school attendance were raised by one or two years the number of young children, none of whom attended school, would be increased in proportion, and a large number of young children who are now exposed to the risk of infection would be comparatively safe." Dr. James Kerr says in his book Fundamentals of School Health: "I have always disagreed with this doctrine." Six years later the *Lancet*,[2] speaking of the compulsory attendance of contacts at school, comments: "It is incredible that any body of intelligent authorities should countenance a proceeding so fraught with danger to the entire community." Another step was taken in Birmingham, where notices were sent to parents of unprotected children to keep them at home if there was any appearance of illness. This was good health propaganda. C. J. Thomas stated in School Hygiene (1913–15): "the history of measles epidemics proves that, given a sufficiently unprotected population, measles will spread whether there be schools or whether there be none." Kerr made a similar observation on his experience of measles in Bradford, and said that the school is not the main agent in diffusion. He goes even further and maintains that "all the isolation, exclusion or disinfection possible does not postpone the incidence of measles in 10% of those liable by more than five or six months." In 1919 the committee of the American Medical Association and the (USA) Bureau of Education reported that "the closure of schools is an extremely clumsy, unscientific and unsatisfactory method of controlling epidemics among school-children. It results not only in loss of school time and money, but it fails to control, inasmuch as infected children are at large playing in the street without restriction and therefore spreading the infection." This was twenty-three years ago. So at last we progress. In 1923 there was an epidemic of scarlet fever in Islington which continued throughout the period of the holidays when the schools were closed, and school infection cannot therefore have played any considerable part in the dissemination of infection.[3] The Medical Officers of

1. Memo on Closure of and Exclusion from School. H.M. Stationery Office. Pp. 2. 1d.
2. 1912, ii, 249.
3. Report of the MOH for London, 1923, p. 17.

Schools Association have contributed much to this subject. Their pamphlet The Control of Measles, issued in 1913, was of great value in the struggle for sanity. In addition they have revised their Code of Rules many times since its first issue in 1885; their latest (10th) edition was published in 1940. This Code was written mainly for public and preparatory schools, but it is full of information on infectious disease as a whole. The official memo notes that medical officers in some urban areas recommend that the practice of allowing contacts of measles, german measles and chicken-pox to attend school might be extended to include those of any of the common infectious diseases of childhood, except on the rare occasions when there is some special reason why an individual child should be excluded. These medical officers feel that the attendance of contacts at school makes their daily supervision by the school medical and nursing staff easier and facilitates the early detection of fresh cases.

POST-ARSPHENAMINE JAUNDICE

In the past eighteen months there has been a widespread impression that syphilitic treatment is too often being complicated by jaundice. No figures have so far been published to substantiate this view and it would be useful if the Services would publish their experience. Various factors prevent an accurate estimate of the incidence, but most of them have been operative in the past also and would not vitiate the comparison. The differential diagnosis in such cases is by no means easy, for, in addition to liver damage by spirochætes and arsenic, the syphilitic patient is at least equally exposed to the other disease processes which may produce jaundice. Infection of the liver in early syphilis is probably common but seldom shows itself clinically, and tests of liver function have hitherto contributed little to the detection of subthreshold hepatic syphilis. Once treatment is well established it is difficult to believe that subsequent jaundice is syphilitic in origin, since the arsphenamines are stored in the liver. According to Mathieu[1] 40% of the drug remains in the body seven days after intravenous injection; Bulmer[2] states that more arsenic is excreted in the fæces than in the urine, the bile being the main channel of excretion; and arsenic has been found in the bile 25 minutes after the intravenous injection of neoarsphenamine.[3] Jaundice occasionally appears after the initial one or two injections and in such cases is probably due to a Herxheimer reaction. More usually it develops after 8–12 injections and the arsphenamines are probably contributory in such cases. Moreover, the incidence of jaundice developing during the treatment of syphilis has increased since the introduction of the arsenobenzene preparations; in cases treated with arsenicals the reported incidence of jaundice varies from 0·6%[4] to 5%,[5] while the extremes for untreated syphilis are 0·18%[6] and 0·37%.[7] There has been no evidence to correlate cases of postarsphenamine jaundice with the use of any one arsphenamine preparation or with any particular batch of drugs. In 1920, Stokes and his colleagues[8] expressed the view that the icterus was due to infectious hepatitis unrelated to syphilis or to the arsenicals; and since the confirmatory epidemiological work by Ruge[9] in the German navy, this view has become increasingly accepted. Roholm and Iversen[10] have shown by biopsy that infectious hepatitis is a diffuse hepatitis, and Andersen[11] has demonstrated that the virus responsible is pathogenic for swine and transmissible from man to swine and from swine to swine; 5 of the cases in which Roholm and Iversen performed biopsy developed jaundice during or after treatment with arsenobenzene compounds, and the histological changes in the livers of these patients did not differ from those found in other cases. The signs, symptoms and clinical course are also similar and it is reasonable to suppose that many cases of postarsphenamine jaundice are due to virus infection, the resistance of the liver having been impaired by the toxic action of the arsphenamines. Epidemiological studies of infectious hepatitis[12] suggest that the disease is probably transmitted by droplet infection, that the incubation period is between three and six weeks, and that patients are infective early in the disease and cease to be a danger to others within a week of the onset of symptoms. In view of the early infectivity and the occurrence of mild and undetected cases, epidemiological control is difficult. War conditions favour the spread of infectious hepatitis, and localised epidemics among Service and war-factory personnel may well occur.

ARCUS SENILIS

A GREY annular opacity, just inside the corneal circumference, is seen in almost all elderly people. Its name is unfortunate for it implies a senile change, and thus when found in those under the age of 40, as it often is, suggests premature senility. In these younger patients it might better be termed arcus presenilis or juvenilis. It never causes symptoms or interferes with vision, and has roused only occasional academic interest. The first histological examinations were made by Canton[13] in 1850. His findings were confirmed by Virchow in 1852 and His[14] in 1856, who found the lesion to consist of intracellular globules and considered it a fatty degeneration. Since then several other views have been put forward but Rohrschneider[15] and Lowenstein[16] have now confirmed that it is a lipoid infiltration and have produced it in animals by feeding them on a cholesterol-rich diet. Histologically, the fatty droplets are intracellular, the smallest being in Bowman's membrane where they produce the sharp edge which, as can be seen clinically, leaves a clear ring of cornea between the opacity and the corneal circumference. In the deeper layer the droplets are both intracellular and extracellular and run right up to the corneal margin. Clinically, the arcus is of no consequence, but at operation it may occasionally cause the surgeon to doubt where the cornea ends and the sclera begins. Following up a statement by Rohrschneider that it is usually a sign of arteriosclerosis elsewhere in the body, Rintelen[17] has carried out an investigation at the Institute of Morbid Anatomy in Basle. In 600 autopsies he found that a macroscopic arcus senilis existed in 214, and that there was no sign of arteriosclerosis in 66 of these (31%). In 97 (45%) there was a moderate arteriosclerosis, and in the remaining 51 (24%) it was severe. In 39, all over 60 years of age, there was no arcus, though 13 of these showed severe arteriosclerosis and 7 of them had died of a vascular lesion. The arcus was found 4 times in patients under 50 and in none of these was there macroscopic or microscopic evidence of arteriosclerosis. Since arcus senilis and arteriosclerosis both arise in elderly people, it is natural that they should often be seen together in the same patient; but from Rintelen's investigations as

1. Mathieu, L. *Rev. méd. Est*, 1922, **50**, 713.
2. Bulmer, F. M. R. *J. Pharmacol.* 1923, **21**, 301.
3. Obregia, A. and Carniol, A. *C.R. Soc. Biol. Paris*, 1915, **78**, 468.
4. Harrison, L. W. *Canad. med. Ass. J.* 1917, **7**, 31.
5. Clément-Simon and Vulliémez, *Bull. Soc. franç. Derm. Syph.* 1920, **27**, 263.
6. Wile, U. J. and Sams, W. M. *Amer. J. med. Sci.* 1934, **187**, 297.
7. Werner, S. *Münch. med. Wschr.* 1897, **44**, 736.
8. Stokes, J. H., Ruedemann, R. Jun. and Lemon, W. S. *Arch. intern. Med.* 1920, **26**, 521.
9. Ruge, H. *Arch. Derm. Syph., Wien*, 1927, **153**, 518; *Derm. Wschr.* 1932, **94**, 278.
10. Roholm, K. and Iversen, P. *Acta path. microbiol. scand.* 1939, **16**, 427.
11. Andersen, T. T. *Acta med. scand.* 1937, **93**, 209; Andersen, T. T. and Tulinius, S. *Ibid*, 1938, **95**, 496.
12. Newman, J. L. *Brit. med. J.* 1942, i, 61; Pickles, W. N. *Lancet*, 1939, i, 893.
13. *Lancet*, 1850, i, 560.
14. Normale und pathologische Anatomie der Cornea, Basel, 1856.
15. *Klin. Mbl. Augenheilk.* 1925, **74**, 93; *v. Graefes Arch. Ophthal.* 1927, **118**, 131.
16. *Mbl. Augenheilk.* 1936, **96**, 765.
17. *Schweiz. med. Wschr.* 1942, **72**, 515.

well as from clinical experience it is safe to say that the possession of an arcus senilis does not mean its owner has vascular disease.

VENOUS OBSTRUCTION IN VOLKMANN'S CONTRACTURE

THOSE who have held that venous obstruction is the most important factor in the production of Volkmann's ischæmic contracture have based their belief largely on a supposed special vulnerability of the communication between the superficial and deep venous systems around the elbow. If, as has been held, the communication depends on one small venous channel lying deeply in the antecubital fossa, it is easy to visualise its complete interruption by the compression of swollen and bleeding tissues, and particularly by a subfascial hæmatoma. In a series of careful anatomical studies Horwitz [1] has demonstrated the variations that can occur in the communications between the deep and superficial venous systems at the elbow. He has shown that there are three distinct collateral veins or venous networks in addition to the so-called communicating vein. By injecting radiopaque medium (30% sodium iodide) into the upper extremity of 10 cadavers, a series of complex networks was demonstrated additional to the four communications which were large enough to be made out by gross dissection. The sodium iodide injected into one of the radial or ulnar veins appeared immediately in the arm above the site of ligation. Injection was practised not only with an intact venous system but also after ligation of the communicating vein just distal to its termination in the cephalic or median cubital vein, and of the brachial veins just above the site of their formation. The solution, despite these obstructions, immediately entered and coursed up the arm in every instance. Horwitz concludes that a good collateral venous circulation normally exists in the elbow region, well protected by muscle planes and external to the confines of the antecubital fossa. The anatomical basis of the venous-obstruction theory of Volkmann's contracture is thus undermined. That sudden experimental venous occlusion may produce a condition resembling ischæmic contracture can perhaps be explained through a vasomotor reflex. There is now sufficient evidence that trauma to an artery can produce reflex ischæmia, and the otherwise inexplicable ischæmia of the white leg of venous thrombosis has also been regarded as evidence of this reflex mechanism.

CHRONIC INFLAMMATION

SO-CALLED chronic inflammatory tissue, of no discernible origin, is often encountered in human pathological material, and it is generally assumed that the cause—whatever it is—is extrinsic and that the agent responsible should be identifiable in the inflammatory tissue itself. Pullinger and Pirie [2] have obtained evidence to suggest that non-specific chronic inflammation may be intrinsic in origin and more subtle than is usually suspected, and that it may persist for a long time after the visible causative agent has disappeared. They made a series of implantations of sterile purified collagen from the cornea of the ox between the dermis and the panniculus carnosus of rabbits. Biopsy specimens were removed at weekly intervals and a more or less continuous histological picture of the cellular reaction was so obtained. The implants were rapidly surrounded by a cellular and fibrous vascular capsule, which by the end of the fourth week began to fill up with large foamy macrophages accompanied by lymphocytes and plasma-cells. Collagen fibres had disappeared by the fifth week, but the macrophages contained fragments of material responding to collagen stains, and these persisted without significant change until the end of the third month, which is as far as the investigation was carried. After making allowance for minor differences between rabbit and human cytology, the general histological picture after the fourth week, when the collagen fibres disappeared, was closely comparable to that seen in human non-specific inflammation. Collagen is a highly resistant substance: it is no more than feebly dissolved by any known proteolytic enzyme which works within the neighbourhood of neutrality. Pullinger and Pirie suggest that it is the relative insolubility of the collagen that is responsible for the reaction and its persistence, and that an alteration in the physicochemical properties of the subject's own less soluble structures may in certain cases initiate it. They do not think that the heterologous origin of the collagen played a significant part in the reaction, though ideally a control using homologous or even autologous collagen implants would have been desirable. Their paper has a bearing on skin-grafting, since such grafts contain a high percentage of collagen and are often laid directly on the surface of granulation tissue.

1. Horwitz, T. *Surg. Gynec. Obstet.* 1942, **74**, 871.
2. Pullinger, B. D. and Pirie, A. *J. Path. Bact.* 1942, **54**, 341.

PROPHYLACTIC TETANUS ANTITOXIN

THE War Office reminds medical officers[1] that tetanus antitoxin should be given to all battle casualties even though they have had tetanus toxoid in the past or tetanus antitoxin recently. It should also be given to patients suffering from any wound which seems likely to be infected with tetanus. When antitoxin is given subcutaneously a maximum level in the blood is not reached for 3–4 days, whereas if it is given by deep intramuscular injection the same or a higher level is reached much more rapidly, appreciable quantities of antitoxin being demonstrable in the blood within a few hours. Deep intramuscular injection—into the deltoid, the subscapular or outer quadrant of the gluteal regions—should therefore be the normal route; intravenous administration is not recommended *for prophylactic use* because of the possibility of anaphylactic reaction. The minimum dose should be 3000 units, but this should be doubled or trebled where there are very foul lacerated wounds. If there is documentary evidence of active immunisation with tetanus toxoid a single dose of antitoxin is sufficient; otherwise two further doses of 3000 units should be given at weekly intervals.

SURFACE FREEZING FOR DEEP PAIN

THE views of Leriche on the value of local anæsthesia in promoting recovery from simple ligamentous and muscular injuries are now widely accepted. The abolition of nervous impulses from the damaged structure interrupts the vicious circle of reflex muscle-spasm, vasodilatation and œdema, and accelerates return to normal function. Two papers in this issue describe the benefits of freezing the skin with ethyl chloride when dealing with underlying painful lesions of soft tissues, periarticular structures or even chronic joint affections and fractures. Henry describes striking relief in a variety of cases, while McIntosh and Petrie, writing from a Canadian hospital in Britain, record similar results in minor injuries, particularly around the ankle-joint, in soldiers. There is no doubt that the method works, but explanations of its action are lacking. Henry demonstrated by inserting a thermometer into the thigh that the chilling does not reach deep structures, and his happy experience with a colleague's dachshund seems to rule out the element of suggestion. The now established work of Kellgren [2] on pain referred diffusely from muscular and ligamentous foci seems relevant. It is possible that anæsthetisation of the superficial area of reference by freezing may abolish the pain, as in the classical though disputed experiments in which referred pain of diaphragmatic origin was abolished by infiltrating the skin of the shoulder with procaine. But this is another of those well-founded clinical observations which still await the elucidation of careful scientific research.

1. *Army med. Direct. Bull.* July, 1942, p. 3.
2. Kellgren, H. J. *Clin. Sci.* 1938, **3**, 174.

Special Articles

SUPERVISION OF SICK ABSENCE IN INDUSTRY

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BEFORE the war some large firms—though relatively few—had already recognised the value of employing medical advisers, whole- or part-time, and of keeping staff sick records. Since the war many more such advisers have been employed in Government and other factories, and there has been a general recognition of their value, not only to employers, whether state or private, but to employed. But there is probably still a residuum of suspicion among many workers and their unions and associations that these medical services are mainly of a police character, and have the object of scenting out malingerers and slackers and of bringing ill or injured employees back to work at the earliest possible moment—perhaps too early—in the interests of output or the maintenance of profits.

Where departments or firms pay their employees while they are away from work owing to illness, or where they are paying compensation for accidents incurred on duty, or illness due to occupational causes, it would be generally admitted that the employers have a right to their own medical adviser's opinion about the genuineness and nature of the illness, and the prospects of either full recovery or ability to perform, if available, some lighter form of work. There may too have been managements and medical advisers with what psychologists might call a malingerer complex; but few people with a wide experience of industrial sick absence and of industrial medical officers would agree either that malingering is common (in the true sense of the word it is exceedingly rare) or that industrial medical officers as a body are malingerer-hunters or capable of being bought by their departments, firms or industries to the extent of failing to give honest medical advice. Most doctors in industry are concerned to see that the staffs of all ranks under their care are as healthy and happy as possible, employed in the right sort of job for their particular physical and mental abilities, and working in the best conditions practicable.

It has been argued that all this can be left to the employee's private or panel doctor, who knows—or should know—better than anybody else his patient's particular physical and mental make-up and domestic circumstances, and who, being an outside independent doctor, is less likely to be biased in his estimate of his patient's working capacity. There are clearly contributions that he is the best person to make; but the industrial medical officer has—or should have—data not generally available to the private or panel doctor. He should have accurate sick records, perhaps extending over many years, and including absences from work that may not, owing to their brevity, have been medically certificated. He should have intra-departmental or intra-factory or intra-office knowledge, not available outside, of how a man or woman or boy or girl reacts to the work in hand and the environment, physical or personal, in which it is performed. And he is—or should be—in a position to secure modifications of work or environment which may make considerable difference to health and efficiency. In other words he should be the supplement not the antagonist of the private or panel doctor; and both should be the friends and confidants of those under their mutual care.

The essential basis of supervision of sick absence is the maintenance of accurate individual sick records, in such a form that they can be studied at any time by the industrial medical adviser, and that the average annual sick absence per head of staff can be regularly recorded. Thus an adequate picture can be obtained of the history of working capacity of any employee and of a whole department or industry. The working-capacity medical history may not always be synonymous with the clinical medical history. Thus many hospitals and doctors keep a follow-up record of various groups of cases: by interview or letter they learn from their patients of the presence or absence of signs or symptoms, and base on this their views of the success or otherwise of some operation or form of treatment. But they can seldom gain by these means such an accurate picture in terms of actual working capacity as a department, or works or industry can—or should be able to—from its own day-to-day and year-to-year sick records. Such records can bring into a much truer perspective the actual effect on workaday life over a long period of some operation, treatment, or real or supposed physical defect or disability. Examples of this in the cases of gastric and duodenal ulcers,[1] pulmonary tuberculosis,[2] adolescent albuminuria,[3] contacts with zymotic fevers[4] and other conditions have been given in previous papers, and many more long-distance, large-scale observations of this kind should be obtainable from industrial sick records. The supervision of sick absence in industry should thus be capable of making essential contributions to the advance of general medicine and surgery.

* * *

It is perhaps in the great field of minor maladies—in which temperament, anxiety, lack of a sense of responsibility, maladjustment and physical ill health meet and mingle and influence each other most—that the supervision of sick absence in industry can play its most valuable part and give an opportunity for preventive medicine. The sick absences of two or three days, or less than a week are probably about four times as frequent as those of a week or more, although this may not—perhaps owing partly to the present form of panel certification—be reflected in the statistics of sick absence under the National Health Insurance scheme. Many of these short sick absences may be due to organic causes, such as decayed teeth or septic tonsils, a lack of resistance to some particular common pathogenic organism, or some form of minor chemical allergy; and the proper routine supervision of sick absence should give the industrial doctor the opportunity of suggesting an appropriate remedy. But there will remain a considerable number (though a minority) in any large staff of employees with an abnormal yearly record of minor sick absences, for which no obvious organic basis can be found. And it is among these that the industrial doctor—provided he has sympathy and common sense and the insight that grows with experience—can be most valuable, especially to the young.

Over and over again he will find some such factor as groundless anxiety, thwarted or seemingly thwarted ambition, some personal antagonism, real or fancied, to a particular job or fellow-worker or foreman or office superior; and he will be able to make an adjustment which results in an immediate and permanent alteration in the sick record. Or he may find some factor of irresponsibility, not of malingering in any serious sense, but of a too light-hearted taking of a day or two off for medical or semi-medical reasons. Few people, and especially young people, memorise their own sick records; and many when confronted with them in black and white are genuinely surprised by their extent; often a complete alteration is the result. If there is no change and no definite physical or psychological cause is discovered for repeated minor sick absences, a kindly intimation that if the record continues as in the past the question of retirement or discharge on medical grounds will arise may have a considerable effect. This was illustrated in a group of workers on whom I have previously reported.[5] Over about 4 years this group of 40 people, mostly young, had incurred between them 736 separate sick absences, totalling 6194 days; after receiving the intimation described, these 40 people during the next six months only incurred 54 days' sick absence, their six-monthly average of illness dropping from 19 days a head to 1·3. It would be unfair to describe supervision of this sort as medical police-work in any vindictive sense, since it was clearly of benefit not only to the departments but to the workers concerned; and it may be that such supervision may prevent the development in later years of a valetudinarian outlook on life much harder to combat. In any large staff, there will also probably be cases in which the real reason for continued minor illnesses is a fundamental dislike to the particular occupation. In such cases, medical advice to seek some other mode of life is probably in the truest interest of the employee.

In the exercise of medical supervision of sick absence, the industrial doctor will soon come to appreciate the importance of lay supervision by foremen, forewomen, heads

of offices or departments, or works managers. It would probably be unwise that he should have any direct voice in their selection and thus come to be regarded by the staff as an agent of promotion; but he should certainly be given the opportunity of putting certain aspects of lay supervision to would-be candidates for the work, since it is on the qualities of a lay supervisor—his or her own health, self-control, sympathy and tact—that sick-rates will largely depend. An instance of how profoundly a change of lay supervision may work is shown by the average annual sick absence in days per head of the following five groups of workers all in one office.

	MEN				WOMEN	
1st year ..	15·0	15·4	14·7	.. ..	24·5	25·8
2nd year ..	16·7	14·1	23·5	.. ..	35·1	39·8
Change of lay supervision						
3rd year ..	8·0	6·9	13·2	.. ..	22·1	12·9
4th year ..	7·0	7·3	10·3	.. ..	14·3	10·7

The change of lay supervision was not the only factor in this immediate reduction, but it was undoubtedly the principal one—the conversion of the office concerned into what the sailors call a happy ship.

This is not to suggest that industrial medicine, outside a few occupational diseases, is a separate and exotic art: it is merely ordinary medicine applied inside an office, works or factory. But it is work which a panel or private doctor could not reasonably be expected—or indeed have the necessary data—to do.

1. Bashford, H. H. and Scott, W. L. *Lancet*, 1935, ii, 710.
2. — — *Ibid*, 1936, ii, 1115.
3. Bashford, H. H. *Ibid*, 1926, ii, 1305.
4. Scott, W. L. *Ibid*, 1937, ii, 397; *Ibid*, 1941, ii, 739.
5. Bashford, H. H. *Proc. R. Soc. Med.* 1938, **31**, 185.

TWO REPORTS ON MEDICAL MAN-POWER

IN January, 1941, the Committee of Enquiry on Medical Personnel, known as the Robinson Committee, made some valuable recommendations on the distribution of medical man-power between the civil and fighting services and general practice,[1] the last of which was that an effective organisation should be established to settle questions of priority. The Ministry of Health then appointed a Medical Personnel (Priority) Committee,[2] under the chairmanship of Sir Geoffrey Shakespeare and widely representative of civil and military medicine, to investigate "what further steps can usefully be taken to secure the utmost economy in the employment of medical personnel" and to report from time to time what should be the allocation between civil and military services of the available personnel. This Shakespeare Committee has now published its first two interim reports,[3] many of the conclusions of which have already formed the basis of official recommendations to hospitals and others.

FIRST INTERIM REPORT

When the committee issued its first interim report, on Aug. 6, 1941, it had held 25 sittings and had made a personal tour of No. 4 Civil Defence Region and other areas to study the arrangements made to meet Service and civilian medical needs, besides analysing the demands of the three Fighting Services for the last 6 months of 1940 and inquiring into the medical establishments of the EMS and other hospital and health services. At that time the committee had received much evidence of coöperation between the Services, but it reported that the degree of coöperation varied from region to region and that much more might be accomplished if the goodwill already existing expressed itself through a recognised machinery; in few areas had a concerted effort been made to ensure the most economical use of the available medical man-power, whether Service or civil. It recommended that a committee should be set up in each Civil Defence Region, to include senior medical officers of the Fighting Services in that region, the regional medical and hospital officers of the Ministry of Health, the liaison officer for the area appointed by the Central Medical War Committee (CMWC), and a neutral chairman, preferably the regional commissioner or his deputy. The task of these committees would be to review the state of medical man-power in their regions from time to time with a view to preventing underemployment and overlapping, their reports, after submission to the Government departments concerned, forming a basis for recommendations by the Medical Personnel Committee itself.

This report stated that it would be difficult, on the basis of the age-groups for compulsory enlistment then in force, to obtain for the Fighting Services all the male civilian doctors who could be spared, because of the uneven geographical distribution of the age-groups and a relative shortage in certain areas of male doctors under 41. In addition, there were a large number of doctors of military age in hospitals whose removal would be impracticable. It was possible to transfer a doctor from one salaried post to another, but the difficulties of transferring general practitioners from one practice to another were considered insuperable, on account of the personal nature of their work and the financial problems involved. The committee therefore suggested raising the age-limit for compulsory military service for doctors to 5 years over that for the rest of the population. So as to enable the unavoidable drain on hospital staffs to be made with the least possible loss of efficiency the committee advised the Minister of Labour to use his powers under Defence Regulations to secure that whole-time staff could be transferred as desired to meet a threat of invasion or in any other period of stress.

Finally, the committee recommended that the medical officers of the Anti-Aircraft and Balloon Barrage Commands should be pooled and employed on a regional basis.

SECOND INTERIM REPORT

In the next six months the committee held a further 24 sessions, and periodically framed resolutions on which official action was taken. It issued its second interim report on Feb. 11, 1942. In August, 1941, this report related, each Fighting Service was asked to review its establishments and requirements and submit a revised estimate in the light of the economies effected as a result of the committee's recommendations. These revised estimates were discussed with the Service representatives and agreement was reached on minimum requirements after considerable economies had been effected. The number of doctors supplied by the CMWC to the Services in July–September left a deficit to meet Service needs for the last 3 months of 1941. The report goes on:

"We examined in detail reports of members of the committee who visited certain Service establishments and discussed this with the Service departments. We also impressed on these departments the serious shortage of medical practitioners and the importance of adequate medical supervision for the civilian population. The Services appreciated the position. They again reconsidered their requirements and effected further economies. The Royal Air Force accepted cuts amounting to about 37% on its original demands for the last 6 months of the year; the Army so revised their estimates that they reduced their original demands to nearly 40%; while the Navy accepted a cut of 50% on their requirements for the last 3 months of the year. We carefully considered these revised requirements and made recommendations regarding the number of doctors to be supplied for the last 3 months of 1941 to each of the Fighting Services. Practically all of this number were supplied to the Services by the Central Medical War Committee by the end of 1941; the deficit was made up in January, 1942."

The committee reported that considerable economies had been effected by the three Services, and that its suggestion for pooling the medical officers of the AA and BB commands had resulted in a substantial saving

1. See *Lancet*, 1941, i, 587.
2. The members of this committee were: Dr. J. Crighton Bramwell, Dr. J. A. Brown, Dr. W. M. Knox, Sir Hugh Lett, Surgeon Vice-Admiral Sir Percival Nicholls, Prof. R. M. F. Picken, Major-General R. C. Priest, AMS, Air-Marshal Sir Victor Richardson, Prof. Sydney Smith, Mr. H. S. Souttar, FRCS, and Sir Charles Wilson. Dr. G. C. Anderson attended as secretary of the Central Medical War Committee and Mr. S. B. Chrimes, PhD, as observer for the Ministry of Labour. The secretaries were Dr. C. J. Donelan and Lieut.-Colonel J. T. Robinson, RAMC. Sir Hugh Lett was a member in virtue of his presidency of the Royal College of Surgeons; his place was taken by Sir Alfred Webb-Johnson in July, 1941, and the vacancy thus created was filled by the appointment of Sir Girling Ball. Major-General R. J. Blackham, AMS, replaced Major-General Priest in October, 1941. Mr. L. Infield was appointed an additional secretary in August, 1941.
3. H.M. Stationery Office, pp. 12, 2*d*.

in the latter, though still further effort should be made in the direction of pooling.

Indian Medical Service.—The committee asked the CMWC to make every endeavour to supply a specified number of medical officers a month to meet the demands of the IMS. Compulsory powers could not be exerted to compel doctors in this country to accept service in the IMS, but the Government of India had introduced liberal concessions regarding antedate, &c., for candidates in India, and it was hoped that the application of these concessions to candidates in Britain would result in a satisfactory supply. If volunteers for the IMS were not forthcoming, it would be necessary to make up deficiencies by the supply of additional RAMC officers. Difficulties had arisen in regard to the service of RAMC officers with formations of the Army in India because of the reduction of the pay of such officers, when serving outside India, to British rates, but this policy had been changed and the War Office and India Office had agreed on the conditions under which the Army in India might draw to a larger extent on the RAMC.

Emergency Medical Service.—The committee considered that the extent and basic principles of EMS organisation should be reviewed, in view of the additional functions it had acquired and the cuts in hospital staff. The committee suggested that it should be possible, without running unjustifiable risks, to reduce many of the establishments and even close a number down altogether. There were a considerable number of civilian mobile teams but few appeared to have been used. The whole-time staff of all hospitals should be more mobile and each region should prepare schemes to secure the greatest degree of coöperation and interchangeability between the medical units of the civilian and Fighting Services.

Ambulance Trains.—The committee had examined the organisation for the evacuation of casualties by ambulance trains under the EMS scheme, but were of the opinion that the use of whole-time doctors for such trains, even when they were unsuitable for the Forces, was uneconomic and unjustifiable. Part-time medical officers carrying out other duties near the places where trains were normally located should be used for this purpose.

Current Needs of the Three Services and IMS.—The requirements of the three Services and the IMS which the committee had approved for the first three months of 1942 were greater than the CMWC could hope to meet from the normal sources of supply. The committee had asked for returns of the medical establishments of all civilian hospitals and medical institutions, and these showed that reduction of medical staffs was feasible in all types of hospitals; that London hospitals were more generously staffed in all categories than Provincial ones; and that a proportionately more drastic reduction was possible in mental-hospital staff. The committee therefore proposed a reduction in the whole-time medical staff of non-teaching hospitals, other than mental hospitals, by 10% in the Provinces and 15% in London, teaching hospitals to reduce their staff by half these percentages; a reduction of 100 in the medical staffs of mental hospitals; and a restriction to 6 months of "A" appointments. These proposals were incorporated in resolutions dated Nov. 19 and Dec. 3, 1941, and action was taken on them.

Other Sources of Supply.—The committee was satisfied that most of the employable alien doctors had already been absorbed into various appointments, and that it was unlikely that this source would help further in the problem of man-power.

On a recent visit to the United States and Canada Surgeon Rear-Admiral Gordon-Taylor had discussed the possibilities of a further supply of doctors from those countries. He thought that no more doctors would be forthcoming under the American Red Cross scheme, but that Canada might possibly make some further contributions. A number of doctors from the RCAMC had been seconded to the RAMC, but the committee considered that no more doctors were available from the Dominions, which already had heavy commitments for their own armed forces.

The committee's suggestion of raising the age of conscription for doctors above that for the rest of the population had been partly met by the National Service (No. 2) Act of Dec. 18, 1941, but some time must elapse before it would produce an effective supply. The committee hoped that as a result of the proclamation all doctors between 41 and 51 would be registered in one group as soon as possible; it was important that women doctors within the age-group 20–30 should be brought under the same compulsion as applied to male doctors.

After scrutinising the establishments of the Public Health and School Medical Services the committee thought that by closer coöperation or otherwise these services could release more medical officers of both sexes for the Forces, and passed a resolution urging the Minister of Health to consider this source of supply on Jan. 7, 1942.

Other possible ways of economising in personnel were brought to the committee's notice. It recommended that more transport should be made available for medical officers in charge of troops so that one MO could do more work. A reduction in the number of recruiting medical boards was considered, but the contribution which this could make to economy in medical personnel was thought to be negligible. It did not seem that any material economy in medical man-power would result from the suggested transfer of certain EMS hospitals to the Army, but the committee approved the project because it was assured that it would be of real value to the Services in providing improved training facilities and opportunities for clinical experience.

General Conclusion.—The committee ended its second interim report with this conclusion.

"Our investigations have satisfied us that the Services are now fully alive to the limited resources available to meet their needs and those of the civilian population and to the consequent necessity for the utmost economy in medical man-power. As a result of their co-operation with us the call by the Fighting Services on the resources of medical personnel during 1941 was substantially reduced. We hope that our recommendations for the saving of medical man-power in civilian hospitals, and the deliberations of the Regional Committees will help to solve our problem during the next six months. We are, however, convinced that continued vigilance in the economical use of medical man-power is necessary."

The committee hoped to submit later a separate report based on the demands of the Services for the last nine months of 1942 and on the reports of the Regional Committees.

In England Now

A Running Commentary by Peripatetic Correspondents

IT is easy to understand that if one is doing fairly well in a black market, or in some more licit but almost equally lucrative war-time occupation, certain transactions must be carried out without bothering one's bank manager. Cash, under such circumstances, becomes the most desirable medium by which to conduct business. But too much cash may become almost as embarrassing as an over-obese credit balance at the bank; some busybody or other might want to find out how it was come by. Then the excess must be converted into some form of wealth, preferably one that is practically certain to increase in value under present conditions and is small enough to be relatively inconspicuous and even in last resort portable. Diamonds and other precious stones fulfil all these conditions most satisfactorily. I am always glad when I learn that these things are being eagerly bought at staggeringly high prices, for I have always had a sneaking belief that some day, somewhere—maybe in the USSR—such vast deposits of precious stones would be found that their prices could no longer be kept up artificially and he who held large numbers of them would be but little better off than one who had collected bits of coloured glass. I should like to live to see that day. I do not greatly mind if these people buy up all the postage stamps in the world, nor do I mind if they sink their surplus cash in sable, ermine or silver fox, for I have great faith in the activities of the moth. But when a vandal who has more cash than he cares to be found possessed of buys old and rare books as a financial speculation, then would I pray earnestly that all his gods should look at him sideways. And this

curse is brought forth by the receipt of yet another bookseller's postcard that says: "Regret item already sold." This, and a little additional information as to just why the man who needs books as an intellectual pabulum is unable to compete with the philistine who regards them as a safe commodity in which to invest his ill-gotten cash, have made me invoke a curse on that present brood of bookbuyers who have no claim even to the equivocal title of bibliophile.

* * *

Mr. Cordell Hull's statement a week or two ago that intense nationalism was the cause of the war surely needs some biological amplification. As I see it, nationalism is to a large group what parochialism is to a smaller one and character is to a person—a reaction against environment, a defence mechanism, with the sole object of surviving as an entity. The big nation that says to its small neighbour, "You'd be much better off with us, much more comfortable; your potty little culture and literature are not worth preserving," is like some rich man saying to a poor man, "Your physique and mental equipment are so despicable that you'd much better let me castrate you and make you into a nice comfortable eunuch footman," whereas both the small nation and the poor man are dominated by biology's stark demand for survival as an entity, for immortality here on earth. Probably the greatest need for the moment is a better knowledge of the biology of man in high places, and since in a democracy this entails the education of the whole people before it can percolate through to their representatives in Parliament assembled, it will not be a quick process. Moreover it seems to me that there is no real absorption of new ideas into the mental structure of man after the age of 25, so that another generation will have to grow up to reap the fruits of biological knowledge. Then and not till then, possibly towards the end of this century, can the nations settle down to the problem that has become increasingly serious since the days of Germanicus: how in the genetical structure of the Germans they can eliminate or displace the genes that give rise to such violent nationalism that defence is interpreted as a process of devouring one's neighbours, genes that are linked with the planning, contingency-foreseeing, industry, tenacity genes on the one hand and with the sex-linked pleasure-in-pain, pleasure-in-humiliation, lust-for-atavism genes on the other. Yes, we'll be lucky if we get that problem settled in a century.

* * *

A young newspaper man got tuberculosis, had an AP induced in London, went to Midhurst for some months where adhesions were cut, and has been working in London for the last three years. He calls his experience "Walking Miracle." (Alan Dick. Allen and Unwin. Pp. 136. 7*s*. 6*d*.). If it is a miracle it is only one in the sense that a buttercup is a miracle, though not quite so common. On the whole his is a readable and amusing book with only a little introspective "flap." That this was verbalised is due to the author's profession; that it occurred is more likely to be a symptom of over-smoking than tuberculosis. A man with or without tuberculosis who smokes 2 oz. of dark flake a day in hospital is clearly an ass (or his physician is). "Nicotine I have been told is an enemy of the TBs"—quite; in excess it robs them of a happy home. He was lucky in getting to Midhurst, which is a Balliol of sanatoria where the two great aims are classically ever in view: actively to cure the patient and teach him how to live. If he'd gone to a municipal sanatorium of the same size which I saw last year he would probably have remained uncollapsed and certainly uninstructed. Patients left after six months without being taught even to take their own temperatures and there were miserably few cases in air splints. Anyone who wants to see the awful effects of bureaucracy on medicine should examine our tuberculosis service.

* * *

I was standing in the Market Place at Portmadoc when a seedy looking individual came up to my companion: "Do you, by any chance, use a three-hole Gillette?" he asked. My companion, I think, suspected he was a pedlar, for he told him he didn't which happened to be untrue, as he had shown me his that very morning in the Station Hotel at Caernarvon. "And do you, Sir?" he turned to me. "As a matter of fact I do," I replied. "Thank you," he said, and walked away. "Why do you ask?" I called after him. "As a matter of fact, I've been walking the Welsh mountains for three months . . ." he began, but at this point my companion pushed me into my car, so I shall never know what was the connexion between three-hole Gillettes and tramping the Welsh mountains. Can it have been a Gallup survey? If so, it just shows the dangers of employing seedy looking individuals, for his result had a fifty per cent. error in it.

One of the things which always strikes me about Wild Wales is the overwhelming place occupied by illness and death in conversation. Listen to two Welshmen talking English and in five minutes you'll know that Gwilym Jones has gone off to Birmingham for his operation, that Myfanwy Evans is poorly again, and that the Rev. Llewelyn Roberts, BA, BD, has died three months ago. At first I concluded that the Welsh were a sickly race, but now I think I was mistaken. It arises because everybody knows, and is often related to, everybody else; and in such a wide circle, illness and death are naturally fairly frequent. In this atmosphere, I wasn't surprised when my companion stopped the car at Aberfynydd to do a little grave-inspecting. After our two-minutes silence, I examined the cemetery. Perhaps the most interesting grave was one which consisted of a square granite frame filled with granite chips. Only, instead of leaving the granite chips to tell their own story, someone had laboriously painted each one green. The green tin vase (empty) in the centre added to the effect. Which reminds me of a railway-side garden I saw at Wolverhampton, with the words VICTORY 1942 picked out in lettuces.

* * *

Your annotation on emotional leucocytosis gave me joy. Now we know why an incipient pneumonic is panicky and the man with a carbuncle bad-tempered—they are merely working up a leucocytosis. Perhaps we ought not to soothe and placate these patients, but rather tell them gruesome stories or make them angrier still. Perhaps some of us do. The instinct for ghoulishness and the matutinal bad temper are understandable now—mobilisation exercises for the leucocytes. In fact what my brother peripatetic of planning purpose and dubious Latinity (Tut, my adrenals!) called *Homo automaticus* is more than ever apparent.

* * *

The train was crowded and at the junction there were still more passengers who, like me, were disregarding the official exhortation not to travel. As we stopped, a large group made for my carriage and good-humouredly packed themselves into every spare space, corridor and all. At their rear was a little man with a mild squint and a large suitcase. His "Excuse, please," denoted him a foreigner, and he was firmly edged in by the porter who just managed to close the door on him. Then began an interesting operation. Preceded by his bleating propaganda—"Excuse, please"—and with his suitcase skilfully used as a Panzer division, the little man worked his way along the corridor where, humanly speaking, there was no possible passage-way. The crowd let him pass with difficulty, but still good-humouredly. Then the propaganda died away. At the next big stop I got out and walked down the platform to see where the little man had landed. Two or three coaches away there he was, sitting back in a seat, an extra over the official number, his suitcase between his knees and a learned-looking book in German in front of him. I got back to my place and mused on all the English folk who good-humouredly stood and let him pass. He got what he wanted. There seems to be a moral somewhere.

* * *

For a holiday I have just been attaching myself to a part of the Army. And if that does not sound like a holiday, I can only say that life consisted entirely in walking, shooting, climbing hills, swimming and sitting in pubs, which is all my best holidays consist of too. There was also an element of sleeping in the rain, and in other ways aiming at being tough; but this again has long been my secret goal. The experience prompted me to think that it would be a good thing if all students could do the same sort of thing, in their final year perhaps and as a preparation for the future jobs as MOs. They would see without responsibility the odd and

unethical problems which may suddenly confront them. When is a blister so bad that the man cannot march, if he wants to? What is the differential diagnosis and treatment when a notoriously tough sergeant remarks on a wet night march that he has a copulating pain in his copulating stomach, and, on further inquiry, that it hurts like copulation? Ought you to lie him down on his back in a puddle, thus delaying the march and giving everyone else cause for impatience? And if he has an acute abdominal condition and the nearest house is four miles away, what then? Clearly in a month one would not learn all the solutions, but it would still be a good holiday. And for once the conscience might be comparatively easy, the brain comparatively clear.

* * *

"Much as I admire the spirit of adventure that prompts them to do so," said my partner, "I could wish for more than one reason that the small boys would not steal my unripe apples. I spotted several of them robbing my orchard yesterday afternoon and roared at them to be off. Pausing only to cram an extra apple or two into pockets already bulging, they fled. At one o'clock this morning I was hauled out of bed to see young Billy Snell of Elston's Court who had been took terrible bad in his stummick. When I got there I found him suffering from colic and diarrhœa, the result of a surfeit of *my* green apples. I had to employ *my* skill and *my* drugs to relieve him of the consequences of pinching *my* fruit, and, as you know, the Snells never by any chance pay a doctor's bill."

Letters to the Editor

PROCAINE AND PERCAINE

SIR,—For many years I have used some kind of field block as a basis for anæsthesia in every abdominal, as well as in the large majority of extra-abdominal operations. For eight years the solution of choice has been a mixture containing ½% 'Novocain' (procaine *BP*) and 1 : 2000 'Percaine'—something between 100 to 200 c.cm. being injected for each adult case. An additional 40 to 50 c.cm. are often used when a splanchnic block is indicated. The anæsthesia produced is, as far as I can tell, absolutely satisfactory, and partial failures are nearly always clearly attributable to my own technical mistakes. The onset of both anæsthesia and relaxation is rapid, and their duration prolonged. I am content to deduce from this wide experience that it is unnecessary to use percaine in a solution as strong as 1 : 1000.

In this period I have seen convulsions five times. One case was severe, and gave rise to great anxiety; it was controlled almost immediately by 'Evipan' (hexobarbitone *BP*). There were however too many factors present to attribute this to the percaine. The other cases were mild and caused no anxiety at all. In all of them ether had been administered in amounts necessary to produce full anæsthesia. My colleague, Miss H. M. Denton, has noticed a group of symptoms which are characteristic of overdosage, but do not give us any real anxiety. The patient becomes a little blue and respiration is slow. This lasts about 20 minutes. Such cases grow fewer with increasing experience, and they are the only cases I have seen in which toxic symptoms can be attributed to percaine when used in this way.

It has become clear in my mind that some people are hypersusceptible to percaine, and this is more likely to be the case in the very young, and when old age and infirmity coincide. Percaine is contra-indicated in childhood, and should be used sparingly, or not at all, in old age. But this is also true to a less extent with novocain, as Finsterer, with his unrivalled experience, has often pointed out.

London, W.1. H. W. S. WRIGHT.

RECOVERABLE SCHIZOPHRENIA

SIR,—Dr. Hemphill's article of Aug. 8 provides further welcome evidence that convulsion therapy has altered the whole outlook for the better with regard to the prolonged invalidism usually associated with depressive illness. The recognition of this fact is more important than ever at the present time, with the growing shortage of man-power. His article emphasises another point, namely, that convulsion therapy is not a satisfactory treatment of schizophrenia; only four even of his seventeen recent cases made any improvement. A recent article in the *Practitioner* (1942, **149**, 14) suggested that insulin has now been superseded by convulsion therapy as the treatment of early recoverable schizophrenia. If this view became widely accepted, it would be disastrous for the patients concerned. Dr. Hemphill's findings are confirmed by other clinicians in this country and by the much larger investigations done in America, such as those of the New York State Hospital. There a thousand schizophrenics treated with convulsion therapy did even worse than an equivalent control group left untreated, while over a thousand cases treated with insulin did three times as well. A follow-up showed that, even two years later, 60% of the cases treated with insulin in the first six months of their illness were still out in the community (*Amer. J. Psychiat.* 1941, **97**, 1007). Another paper (*J. nerv. ment. Dis.* 1942, **95**, 597) emphasises this point in a more direct manner. A hundred admissions to a mental hospital, mostly schizophrenics, failed to respond to convulsions and were subsequently treated with insulin; 81% of the cases who were given insulin treatment within six months of the onset of their illness made a complete recovery, despite the failure of convulsion therapy. But the figures dropped to 25% for those who were treated in the first year but not until after six months. In fact, the need for early routine insulin treatment for recoverable schizophrenia becomes more and move obvious as results are published. To neglect it means condemning large numbers of patients to prolonged invalidism and in many cases to life-long incapacity. The need for discrimination in the treatment of schizophrenia is illustrated by the fact that since the outbreak of war several thousand schizophrenics have entered mental hospitals for the first time, with an average expectation of life of 25 years or more.

Sutton, Surrey. WILLIAM SARGANT.

ILL-TIMED SOCIAL OPPORTUNISM

SIR,—What can we do for the war effort, we who are ageing and others who have not sufficient direct war work to satisfy our energy? We must be busy all the time, or at least imagine ourselves to be so, and we throw ourselves feverishly into activities of various descriptions. In particular, we serve on various committees that, as someone has said, make minutes and waste hours—that plan for an unknown and quite unpredictable future, that seek to eliminate tuberculosis and so forth: all maybe invaluable work, but when every ounce of energy is needed for immediate war effort the question undoubtedly arises whether we are not merely indulging in ill-timed social opportunism. The most perfect of medical services and post-war schemes will do little if anything towards winning the war, but attempts in these directions may seriously hamper our war effort.

We say of course that such things do not detract from our war effort, for they are all done in our spare time, but do we consider the call on the services of others which our work involves? As an instance, mass radiography of the lungs involves not only man-power in the manufacture of apparatus, materials and working the apparatus but also the provision of an extended medical service and of extra beds to deal with the suspects and the definite cases of tuberculosis that are detected. A conflict of loyalties to the present and the future is involved, for on the one hand every ounce of man-power is needed for the present, both in industry and in the profession, while on the other we must employ man-power for work which, however desirable for the future, cannot be called essential for the present. I am not concerned with either the merits of schemes or their practicability at the present time, but their mere consideration may well be subversive to the total war effort at which we all aim. But who are we that we should criticise on these lines when the inspiration for them comes from those in high authority and with all the backing of public opinion?

What can we do, then? As much planning as we like, provided it does not interfere with direct war work, though my own conscience has twinges even in this. Perhaps our best and most difficult war work would

be to abandon many of our activities and devote ourselves to doing nothing in particular.

Thousands at His bidding speed,
And post o'er land and ocean without rest;
They also serve who only stand and wait.

FRCP.

PRACTITIONER AND PATHOLOGIST

SIR,—It is indeed disappointing to read your editorial statement of August 15 that when the medical student goes into practice "he soon discovers that if he wants laboratory tests done he must either call out an expensive consultant or send his patient to the outpatient department of a hospital. . . ." We have the authority of Dr. Dyke that this is far from being the true position in the provinces, where in fact consultation and collaboration between practitioner and clinical pathologist does occur without the patient first having to waste time going through the OP department of a hospital. I also know of at least one teaching hospital where medical students are encouraged to interest themselves in clinical pathology as distinct from merely viewing a report returned from the laboratory.

Rugby. R. C. HILL.

SIR,—For some time past the pathological department of this hospital, which incidentally does the pathology for our local council, has also been open to any and every general practitioner in our district, many of whom send specimens or even bring patients direct to the pathologist. We found that this was a welcome innovation to the practitioner and has been the means of giving the pathologist a clearer clinical view of the case than otherwise would have been possible. A fee is charged where it is possible for the patient to pay, but inability to pay is no bar to the examination and report.

J. C. GILBERT,
St. John's Hospital, Lewisham. Secretary Superintendent.

SIR,—In reply to the following extract from your leading article of August 15:

"Let it be more widely recognised that the pathologist is not a technician but is as a rule a man with a wide and accurate knowledge of medicine which he is glad to put at the disposal of his clinical colleagues."

Let it be more widely recognised also that neither is the technician a pathologist, but is as a rule a man with a wide and accurate knowledge of laboratory technique and the significance of laboratory findings, which knowledge he is glad to put at the disposal of the medical profession in those hospitals where no pathologist is employed.

Little Shrewley, War. F. GARDNER.

REACTIONS TO THE REPORT

SIR,—Ultracrepidation is a most pleasant vice and during the two months that have elapsed since the publication of the Interim Report I have resisted nobly, knowing that, for one who has never been in general practice, comment is hardly seemly. However, the silence of my colleagues and the reassurances of Lord Darlington have encouraged me to overcome my scruples.

Few would disagree with the broad definition of the objects of medical service (Question 1, page 41), yet how is this to be achieved? By some form of group practice with clinics or health centres, together with an extension of National Health Insurance to include dependants and enlargement of its scope by the inclusion of consultant and specialist services. Before the war, general practitioners in urban areas and hospital consultants had insufficient time to look to the purely remedial aspects of their sick patients. A conscientious general practitioner has told me that on an average he had only five minutes to see each patient and a hospital consultant that he had only fifteen minutes for each new outpatient; in the country the problem is a different one, for there the time spent in travelling is the major factor.

It is agreed that in a medical service directed towards the achievement of positive health far more attention must be paid to the study of the environmental factors which set a disease process in train, and an elucidation of these is more time-consuming than an exhibition of the clinical acumen of remedial medicine. How often does a hospital patient ask to see a consultant in private, not to receive preferential treatment in hospital nor some superior brand of medicine, but in order to have an opportunity to discuss his or her problems in greater leisure and privacy than is possible in the average outpatient consulting-room? Apart from the disadvantages to the individual patient of this rush medicine, the lack of time for the doctor to contemplate the problems of his cases, examine them leisurely and read about them, must in the end stultify the enthusiasm of any but the most resolute. In medicine one's working day should at least be equally divided between routine work and thinking about it.

In the report it is suggested that the provision of secretarial assistance, &c. at the Health Centre would allow this needed leisure for work; naturally, properly organised working conditions would be an improvement but the real need is for a very considerable increase in the number of practitioners—at a guess an increase of 30%, whereas the annual increase in registered practitioners is about 3%. To achieve such an increase must involve a long-term plan of medical school expansion, &c., but to propose the introduction of an adequate medical service both from the point of view of the people and the practitioners without an estimate of the number of practitioners required to carry it out can only lead to disappointment and a reversion to a state of affairs as bad if not worse than before, particularly when a large proportion of the profession do not realise the full implications of social medicine.

It should not be thought that the institution of a whole-time salaried service (organised by the state or private enterprise) would achieve the desired result; although there are many who could work as well if not better under such an organisation, there are just as many who would rebel or become drones. With regard to the administrative proposals set out in the report, the brilliant PEP broadsheet *Planning for Social Security* points out the absurdity of proposing extensions of National Health Insurance which would "become nothing more than an extraordinarily elaborate mechanism for *excluding* 10% of the total population from the panel medical services" and would perpetuate the fantastic state of affairs where a sick man may ask to be taken off "the panel" as he will receive more from unemployment relief.

Oxford. A. H. T. ROBB-SMITH.

"ETHISTERONE"

SIR,—I have noted with some perturbation in your issue of Aug. 8 (p. 174) that the General Medical Council has approved of the name ethisterone for the derivative of progesterone known as anhydro-hydroxy-progesterone, pregneninolone or ethinyl-testosterone, and that its inclusion in the British Pharmacopœia is under consideration. In my experience medical practitioners who have not made a special study of endocrinology are already confused by the large number of hormones and hormonal derivatives, and this confusion is increased by the number of synonyms applicable to some of these substances. The addition of yet another name to a substance which already has several will not in my opinion clarify the situation, but will increase the confusion still further.

A. W. SPENCE.

PANCREATITIS AND MUMPS

SIR,—As a corollary to Mr. Rodney Smith's interesting paper in your issue of Aug. 22 on pancreatitis and diabetes, and in view of the fact that pancreatitis is one of the complications of mumps, it is perhaps relevant to mention the occasional association of diabetes and mumps. Eight years ago I described in your columns (1934, i, 947) three cases of severe diabetes in children which came on within a few weeks of an attack of mumps and quoted five others which had been recorded. In only three of these were there definite abdominal symptoms at the time of the attack of mumps. Communications from other physicians have led me to suspect that the association is not as uncommon as is supposed and that it may not be fortuitous. This is supported by E. Gundersen's (*J. infect. Dis.* 1927, **41**, 197) observation that after epidemics of mumps there is a rise in the death-rate from severe diabetes in the young age-group.

Cambridge. LESLIE COLE.

ANTHOCYANURIA FROM BEETROOT

SIR,—Physiological changes in the colour of the urine are apt to puzzle or mislead the practitioner and two cases due to eating beetroot may be worth recording. A man of 41 complained of feeling restless, tired and run down. He had noticed that his motions were loose and his urine pink. He denied taking any drugs but eventually remembered that he had had "rather a lot" of beetroot during the past few days. He had some puffiness of his eyelids, normal pulse and temperature, and except for bad teeth showed nothing out of the way. A fresh specimen of urine was of a pink-violet colour, acid, and contained no albumin or sugar. Guaiacum reaction negative. In view of the puffiness, the absence of albumin, and the fact that he had recently eaten pork sausages a tentative diagnosis of trichiniasis was made. This was later excluded and the diagnosis was cleared up by one of our dispensers who told me he had noticed the same coloration of his own urine after eating beetroot.

In *Chemical Methods in Clinical Medicine* (London, 1937) G. A. Harrison writes:

"Very occasionally the ingestion of common articles of diet (beetroot, bilberries, blackberries, etc.) leads to peculiar colours of the urine. Anthocyanuria, due to ingestion of red beet, is an example. The writer observed a case in a boy of seven (with diabetes mellitus) due to beetroot. The fresh urine was acid and was orange-pink. It turned canary yellow when made alkaline with sodium hydroxide, to become pink again when made acid with HCl. Spectroscopically it showed no absorption bands, and contained no red cells and no hæmoglobin. On discontinuing the beetroot the pink colour stopped, to reappear after giving beetroot again. A dilute watery extract of beetroot gave similar colour changes with alkali and acid. The pigment was not extracted from the urine by amyl alcohol."

The urine in the present cases gave the reactions described by Harrison. The colour diappeared on withholding beetroot and returned after more had been taken. In the first case puffiness of the eyelids disappeared in two days. I should add that this discoloration from beetroot does not invariably occur in normally and constantly acid urines (as I have proved on myself).

My thanks are due to Mr. B. F. Heap, MPS, for his assistance and incidentally for the diagnosis.

The Medical Branch, G.P.O. V. C. MEDVEI.

WORSER DOCTORING?

SIR,—I agree with Dr. Harvey. In a district like this, a town of 4000 inhabitants with a scattered agricultural community round it, I do not see how a doctor could begin to give 8000 potential patients even the attention they need, let alone the attention they want. I suppose it depends on the individual GP, but some of us find the constant making of decisions and giving of opinions, trivial or otherwise, pretty exhausting work. Personally I cannot cope with more than about 60 patients a day (including those who attend the surgery) with even rudimentary efficiency; and I cannot do that for very long at a stretch without getting abominably stale.

RUS ET URBS.

SIR,—Dr. Harvey is right when he suspects I am an urban practitioner; but he is wrong when he suspects that I am ignorant of rural conditions of medical practice, for I had considerable experience of rural practice as a locum tenens some 10 to 15 years ago, and am the son of a GP who for 25 years worked in probably one of the hardest rural practices of this country. Obviously medical working conditions in town and country practice are very different, and I admit that my letter was chiefly meant to apply to urban practitioners. It has been said that in urban districts there must be a minimum of one doctor for every 3000 of the population. I have proved to my own satisfaction that it is possible to give good service to at least 6000 potential patients in a town. In country districts these proportions are obviously out of the question. As Dr. Harvey points out, urban practitioners are in the large majority; therefore I maintain that in medical call-ups larger proportions of men should be recruited from towns. I understand that the German civilian population has to put up with a ration of one doctor per 15,000; and most of these German civilian doctors are no doubt elderly men who had been hoping for an easier life. Of course doctors in the Services do not have to work at the same concentration as civilian doctors, but when they are on active service they have to work very much harder. They can be compared to Civil Defence workers who do not have a very arduous existence when there are no air-raids in their district, but who have to work often for days on end in appalling conditions, with no respite, when the emergency occurs. Moreover, doctors in the Services have to sacrifice the comforts of home life which are a real help to a busy GP. In spite of Dr. Harvey's gentle protest I still feel justified in asserting that our profession as a whole is not pulling its weight. I am positive that I can put forward a scheme whereby a district, whether urban or rural, could manage comfortably with half its peace-time number of doctors.

Southall, Middlesex. G. N. FOX.

VESTED INTERESTS

SIR,—I cannot agree with W. A. G.'s remarks about the sale of practices. It is a fact that a doctor who buys a retiring practitioner's practice does actually take over a large proportion of his patients, both NHI and private. Some may come and some may go but the solid nucleus of the old practice usually remains. If it were not so, practices would not be saleable at the prices asked. It cannot therefore be true that the goodwill of a practice is mainly in the professional ability and personality of the doctor. I think habit is responsible for many remaining with the incoming practitioner. One hears so often remarks like "I've been coming to this house for 40 years"—that is, through a series of three doctors. Further, I think, patients have confidence in their old doctor's choice of a successor.

For myself I do not like the idea of buying and selling practices nor am I opposed to a state medical service. None the less it is true that in the past one has had to put down a certain sum of capital in order to ensure a certain annual income. Doctors are surely just as much entitled to compensation out of public funds as any other business would be if it lost capital and interest through its termination by government action.

E. M. K.

Infectious Disease in England and Wales

WEEK ENDED AUG. 22

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1332; whooping-cough, 1235; diphtheria, 629; paratyphoid, 8; typhoid, 15; measles (excluding rubella), 4089; pneumonia (primary or influenzal), 346; puerperal pyrexia, 172; cerebrospinal fever, 68; poliomyelitis, 19; polio-encephalitis, 2; encephalitis lethargica, 7; dysentery, 59; ophthalmia neonatorum, 86. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Aug. 19 was 1498, including scarlet fever, 278; diphtheria, 130; measles, 278; whooping-cough, 242; enteritis, 46; chicken-pox, 65; erysipelas, 35; mumps, 59; poliomyelitis, 2; dysentery, 30; cerebrospinal fever, 41; puerperal sepsis, 31; enteric fevers, 5; german measles, 4; malaria, 1; other diseases (non-infectious), 126; not yet diagnosed, 125.

Deaths.—In 126 great towns there were no deaths from scarlet fever or enteric fever, 3 (0) from measles, 11 (0) from whooping-cough, 20 (1) from diphtheria, 42 (5) from diarrhœa and enteritis under two years, and 7 (0) from influenza. The figures in parentheses are those for London itself.

The fatal cases of diphtheria were scattered over fifteen great towns, none reporting more than 2. There were 5 deaths from diarrhœa at Manchester, and 4 at Birmingham.

The number of stillbirths notified during the week was 199 (corresponding to a rate of 31 per thousand total births), including 20 in London.

Sir STANLEY WOODWARK has been elected master of the Worshipful Company of Barbers. He has also been re-elected for a further year to be master of the Society of Apothecaries.

Obituary

JOHN MACPHERSON

KT, C B, M D EDIN, F R C P E

Sir John Macpherson, who died on Aug. 14 at the age of 84, was a commissioner in lunacy for Scotland during the first twenty years of this century. His wisdom and foresight was largely responsible for the initiation and framing of the Mental Deficiency and Lunacy (Scotland) Act in 1913, and it was thanks to his tactful dealing with men and matters that it was accomplished with so little friction. He was born at Dores, near Inverness, the son of the Rev. Allan Macpherson, and after graduating from the University of Edinburgh in 1882 he assisted Clouston at the Royal Edinburgh Asylum. His quality was early appreciated, and in 1889 he was appointed superintendent of the Stirling District Asylum at Larbert. Here the building and equipment of a modern hospital block and a pathological department gave him his opportunity as an administrator, and his appointment as lecturer in mental disease at the Edinburgh Royal Colleges also won him recognition as a teacher. He was appointed commissioner in 1899, and of his work at the board a colleague writes :

" Sir John was profoundly interested in the boarding-out of mental patients, which gives the patient a share in family life under kindly and understanding guardianship. Although the supervision of these cases was the duty of his junior colleagues, he often found time to visit them. I think he liked best of all to escape to his beloved Inverness, where many patients were placed in the homes of the kindly highland people in the crofts around, and for years after, on my visits to that district, patients, guardians and public officials alike would speak of him almost with reverence. He had many calls on his time and did a good deal of public speaking, for he always attracted a large and appreciative audience. He breathed a spirit of optimism as to the future of psychiatry, and was a powerful advocate of early treatment. It was an inspiration to accompany him on visits to mental hospitals, when the interests and wellbeing of the patients were always in his thoughts. Behind Sir John's charm of personality there lay singleness of purpose, breadth of vision, balanced judgment and an outstanding intellect which was not confined to his own specialty."

Macpherson's retirement in 1921 proved to be another beginning, for a series of lectures which he delivered in Sydney the following year led to the founding of a chair of psychiatry at the university there of which he was persuaded to become the first occupant. Five years later he returned to this country and finally settled at Cleeve in Somerset. He leaves his widow, a sister of Sir David Wallace, FRCSE, with two daughters.

DAVID LURIE

B M OXFD, F R C S ; LIEUT.-COLONEL SAMC

David Lurie was a brilliant student. He took first place in all South Africa in the matriculation examination and graduated MA with distinction from Cape Town University. He came to Oxford with a Rhodes scholarship and later won an entrance scholarship to Guy's where, perhaps because things came easily to him, he did not seem to take his clinical work too seriously. Yet he qualified in the usual time and took his BM in 1926. After holding some surgical appointments he proceeded to the fellowship in 1932, and shortly afterwards returned to Johannesburg where he was appointed first registrar and later assistant surgeon at the General Hospital, and a teacher in the University of Witwatersrand. He joined the South African Army Medical Corps last year and had lately opened a new hospital when he was killed in a motor accident in Egypt. Though always quiet and reserved Lurie was a good companion, and he was a fine tennis and table-tennis player. Through his death South Africa has lost one of her best surgeons.

Colonel TUDOR GERMAIN LAVIE, late RAMC (retd), who died on July 1 at the age of 80, was educated at Cheltenham College and St. George's Hospital. He took the Scottish and English conjoint examinations in 1884 and two years later received his commission as surgeon. He served as surgeon major during the South African war, taking part in the action at Karee Siding. He was wounded early in the attack on Colonel Kekewich's column at Moedwell but he continued at his duties for many hours and was commended in dispatches. He retired in 1919 with the rank of colonel. Colonel Lavie married a sister of Major-General W. H. S. Nickerson, VC, AMS.

Notes and News

HOSPITAL JOINT CONSULTATIVE COMMITTEES

JOHN R. GRIFFITH, A H O A

HOUSE GOVERNOR TO THE PRINCESS BEATRICE HOSPITAL

THE principle of " consultations with the staff " has always been an accepted part of efficient hospital administration. J. E. Stone,[1] for example, recommends monthly meetings of senior departmental officers as the best method of ensuring a regular interchange of views from all sections of the hospital staff ; in voluntary hospitals the management looks to the medical staff for advice and suggestions on medical questions, and a special committee invariably exists for the purpose ; a further extension of this idea is implicit in the recent recommendation of the British Hospitals Association that nurses' councils should be established to discuss and advise on nursing subjects. Even where no machinery exists for periodical staff meetings, administrators often hold discussions with different members of the staff and it is generally realised that in the management of such a complex organism as a hospital much value is to be derived from drawing on the experience and knowledge of a wide variety of people.

How often in wards and offices of hospitals can allusions be heard to the unsuitability of an item of equipment or the inadequacy of a new extension, which, in the view of the person speaking, could have been avoided if staff had been consulted prior to installation ? Occasionally such complaints have little foundation but they are sometimes justified ; permanent inconvenience and reduced efficiency has resulted in hospitals from plans completed without reference to the people who are to put them into practice. Even the most humble member of the staff can make valuable suggestions for the improved working of the hospital or more economic running of his department if encouraged to do so. War-time needs have revealed how limited has been the application of this principle of consultations with the staff in the past. Financial stress, staff shortage, fire-watching and other special duties, dislocation of service in bombed hospitals and difficulties associated with rationing—these and many like problems might be solved more easily and effectively if hospital managements could obtain the coöperation of every member of the staff. A somewhat similar position arose five or six months ago in industry and there the complexities of the situation were largely met by the setting-up of joint production committees. These committees, consisting of representatives of the management and employees, meet and thrash out questions of production in ways which seem to be producing the goods. Analogous joint committees in hospitals might bridge the gap which occasionally exists between management and staff, and generate suggestions for increased efficiency of hospital work.

In every hospital a committee of this kind could be formed, consisting of representatives of the management (e.g., the chairman of the hospital committee, the superintendent, the matron, and, in local authority hospitals, the steward) with members elected by the staff—medical, nursing (all grades), administrative, technical, maintenance and domestic. Such a joint consultative committee would bring together the numerous hospital departments while making unnecessary the existence of several bodies representing different sections of the staff. The recommendation of the BHA regarding nurses' councils will lead other groups of the staff to propose councils to advise on questions affecting their work ; and if we are not careful we shall be overwhelmed by a

1. Hospital Organisation and Management, London, 1939, p. 292.

multitude of committees—a prospect from which a joint consultative committee would save us.

In industry one of the chief functions of the joint committees has been the attainment of maximum production; in hospitals the committees would aim at achieving the highest possible efficiency. We are all alive to the tremendous demands which may soon be made on us. The establishment of joint consultative committees would be the best way of discovering non-essential work and for making certain that every employee was on his toes, fully conscious that he was a vital element in war service.

SURGEON'S TOOLS THROUGH THE AGES

Sir Arthur Keith has remarked that a historical collection of surgical instruments is essential for an understanding of the history of surgery. Dr. Thompson has had in his care the greatest collection of old and new surgical tools in Europe, including those used by Lister and a unique assemblage of gynæcological and obstetrical implements. These numbered 2365 in 1925 and by 1941 had grown to about 3000 when an appalling disaster befell them. A few of the instruments had been injured by water in a raid and the council of the British Institute of Surgical Technicians had undertaken the repair. Before the work could be completed another raid destroyed nearly the whole of the surgical instrument museum. Some 2000 were salvaged from the debris and of these 1554 specimens and a small collection of Chinese instruments were retrieved in fair condition. The remainder, comprising most of the obstetric, Ismay, Heath, and Down Bros. collections, were badly spoilt. All the specimens, after careful examination and temporary refurbishing, were stored in waterproof metal cases given by the institute under whose direction, when happier days return, they will be renovated by the skilled craftsmen then available. Meanwhile all who are interested in Dr. Thompson's subject will benefit by his prescience in having provided them with a memento[1] of the collection as it was, lavishly illustrated in a way now only open to an American publisher. He traces the scalpel from 3000 BC to the present time, the amputation knife from Súsruta to Liston, and begins his history of the saw with a design made 5000 years ago. He shows the trephine in its various stages from a piece of stone to its modern form. His account of the vaginal speculum reveals the similarity of the modern specula with those of ancient Greek models, and notes that Sims's speculum was the first new basic design invented after many centuries of vaginal inspection. The metal skull saw is shown as a comparatively modern tool, being attributed to surgeons of the Middle Ages. The first bullet forceps is shown to date from 1562, corkscrew types of extractors having been used previously. Other studies give the history of the tourniquet (the most modern of the surgical inventions described), trocars, phlebotomy instruments, and the operation table, of which a thirteenth century illustration (obviously drawn from life) is reproduced showing a patient on a laterally tilted model; lateral tilting is only a recent addition to our modern tables. The first operation tables were used for the rehabilitation work of those early days. It is to be hoped that Dr. Thompson will expand his account while his memory of the collection belonging to the Royal College is still fresh.

WAR-TIME MEDICAL EDUCATION IN CANADA

COURSES have been speeded up so that the second and subsequent years take only eight months and the ordinary rotating internship is cut down to eight months too. This means that the present sixth-year group will graduate at Christmas instead of in the following fall, by which time the present fifth-year group will be finishing. In this way a third (extra) batch is being turned out every two years. It was a bit disconcerting at first, our correspondent writes. April didn't carry with it the feeling of a new year and there was only one week's holiday between terms; students returning to find out their examination results were just in time for the next term. But the speed up is proving effective without skimping training. The chief difficulty has been financial, for the full fees are now needed at closer intervals, with less opportunity to earn during holidays. Most students expect to earn the year's fees and possibly their keep during the summer; many prefer to be independent even though their parents are in a position to pay for them. Now there are only two months' holiday in which to earn. But the Government has sanctioned loans of $300 (£68) a year to students in their second, third and fourth years, while those in their fifth and sixth can join up and continue their studies on service pay at $1.30 (5*s.* 10*d.*) a day, plus a subsistence allowance of $1 a day. Graduates take internships under the same arrangement but without the subsistence allowance. Much the same has happened in the States, where considerable thought has also been given to the choice between grants and loans. On the whole, the feeling is against grants; a loan makes the student more aware of obligation to his university. At all events, the arrangements seem to please prospective students, for the enrolment of freshmen is very great. In Canada the official curriculum has been left unaltered except that in Alberta the anatomy and pharmacology courses have been simplified. Many students however are getting more clinical work in their training by acting as junior interns during their last two years. This has helped to relieve the shortage of senior interns. In the States it has been noticed that first and second year students know less of first-aid than does the trained layman and the subject is to be put immediately into the curriculum. In the clinical courses emphasis is to be laid on tropical and war medicine.

WAR AND THE DIFFICULT CHILD

PARENTS say with feeling that all children are difficult, but the children who stand out from their contemporaries in this respect just now are those who cannot fit into the social and emotional demands made upon them by a world at war: it is, in fact, the situation rather than the child which is difficult. Demands for some residential accommodation for such children, many of whom are mentally subnormal though not actually defective, are increasing. At the suggestion of the Board of Education, the Child Guidance Council have decided to open a home school[1] for boys sent by local authorities under section 80 of the Education Act, or committed to their care under the Children and Young Persons Act. At present the council are seeking for a house to hold about 30 boys. The Mental Health Emergency Committee are also facing this problem[2]; in 1941 they published a memorandum pointing out the need for a classification of hostels, and for psychiatric supervision of difficult children. The recommendations then made on classification, premises, staffing, play activities, rebilleting, and the special provisions needed by children requiring psychiatric treatment are being followed up in a growing number of areas, and plans are being made for children to receive psychiatric treatment either from psychiatrists visiting the hostels or at clinics in the neighbourhood. Wherever psychiatric social workers are available they make any necessary plans for the rebilleting or supervision of such children. Last January the committee conferred on the problems created in hostels by subnormal children who needed long and special training. Representatives of the Ministry of Health and the Board of Education attended, and it was decided that in each region small hostels near schools able to cater for such children might be set aside for them. Part of a generous gift from the British War Relief Society in the United States was used to provide extra play equipment for hostels, and some was set aside to equip a limited number of hostels where child guidance facilities were available. Twenty applications from such hostels for sums ranging from £70 to £140 were met. The evidence so far collected by the Emergency Committee confirms the earlier impression that the number of children—or of adults, too, for that matter—showing nervous disorders as a result of terrifying incidents is relatively small, even among those who had previously been under treatment. Cases due to changed circumstances arising out of the war, though rather more

1. History and Evolution of Surgical Instruments. C. J. S. Thompson, M.B.E., Ph.D., hon. curator, historical collection of the museum of the Royal College of Surgeons of England. New York: Schuman. Pp. 113.

1. Annual Report of the Central Association for Mental Welfare for 1941.
2. Second Annual Report, 1941–42.

numerous, were again fewer than might have been expected. In both groups a large proportion of patients had a predisposition to mental or nervous illness.

University of Aberdeen

Sir JOHN ORR, FRS, director of the Rowett Research Institute, has been appointed professor of agriculture in the university. He will continue to direct the institute.

Lectures in Glasgow

During the winter fortnightly lectures will be delivered on Wednesdays at 4 P.M. in the hall of the Royal Faculty of Physicians and Surgeons, 242, St. Vincent Street, Glasgow, under the auspices of the Dr. John Burns fund, the Finlayson lectureship and the Miss Weild fund. Medical practitioners and medical officers in the services are invited to attend. Sir Joseph Barcroft, FRS, will give the first lecture on Nov. 11, on phases of fœtal life. Other speakers will be: Nov. 25, Prof. H. J. Seddon, recent work in the surgery of peripheral nerve injuries; Dec. 9, Dr. Donald Hunter, generalised diseases of the skeleton; Jan. 13, Mr. R. W. Watson-Jones, surgical and rehabilitation treatment of bone and joint injuries; Jan. 27, Mr. P. R. Peacock, gastric cancer—an experimental approach to the problem of causation; Feb. 10, Surgeon Rear-Admiral C. P. G. Wakeley, the surgical aspects of blast; Feb. 24, Dr. George Riddoch, British neurology in war and its future in peace; and March 10, Prof. Dugald Baird, the high stillbirth and neonatal mortality in Scotland—its cause and prevention.

Medical Honours

The MBE has been awarded to Dr. E. V. Newling, MO in charge of a Westminster mobile unit.

During air raids Dr. Newling has led his unit with gallantry and efficiency. On many occasions he has carried out the treatment of trapped casualties in most difficult conditions with complete disregard of danger from the possible further collapse of demolished buildings.

The MC has been awarded to Captain R. D. Scriven, MRCS, IMS, for gallant and distinguished services in the field.

T/Surgeon Lieutenant D. R. S. Howell, MRCS, RNVR, has received the DSC for bravery and enterprise while serving in the operations which led to the surrender of Diego Suarez, Madagascar. The same decoration has also been awarded to T/Surgeon Lieutenant J. W. Boland, MB Dubl, RNVR, and T/Surgeon Lieutenant Ralph Ransome-Wallis, MB Edin, RNVR, for distinguished services "in taking convoys to and from Murmansk, through the dangers of ice and heavy seas, and in the face of relentless attacks by enemy U-boats, aircraft and surface forces."

Exchanged from the Far East

The following doctors are included in the Foreign Office list (*Times*, Aug. 31) of British refugees from Manchukuo and China aboard the SS. *Tatuta Maru* which reached Lourenço Marques on Aug. 27: Mr. J. M. Leggate, FRCS, and his wife, Dr. A. P. Littlewood and Dr. Margaret Littlewood, Dr. Jean McMinn, (?) Dr. Hugh W. Y. Taylor, Dr. S. L. Strange, Dr. and Mrs. H. F. Wallace and two children.

Colonel G. P. Kidd, MC, MRCS, RAMC, who was reported missing in Libya, is now known to be a prisoner of war in Italy.

State Medical Scheme for Southern Rhodesia

Sir Godfrey Huggins, FRCS, the prime minister of Southern Rhodesia, has announced that the government would appoint a commission of inquiry after they have received the report of the commission to be appointed by the government of the Union of South Africa to inquire into the possibility of a state medical service. He saw no objection to a contributory scheme for Europeans only, but the scheme must not exclude Africans.

Extension of EMS Follow-up Scheme

The Ministry of Health asks hospital authorities to apply this scheme to cases of spinal injury with neurological complications treated in special centres for injuries of the spinal cord and cauda equina. The new category will include cases of civilian war injury, war-service injury in members of a civil defence organisation or the Merchant Navy, and ex-members of the Forces for whom the Ministry of Pensions may accept liability.

Solution to "Osleriana"

(see the Lancet last week)

A	N	T	O	M	M	A	R	C	H	I
N	I	E	N	O	T	S	E	H	P	S
E	L	S	U	R	H	T	D	E	E	M
U	T	A	R	G	O	H	C	Y	S	P
R	A	I	B	A	R	M	H	N	I	L
T	C	R	A	G	N	A	L	E	S	U
A	N	I	G	N	A	R	O	F	L	M
D	I	S	U	I	N	O	L	L	A	B
Y	S	P	E	L	I	P	E	A	T	O
H	A	T	A	L	R	E	N	N	E	J

Notes on solution.—The italicised clues were to be found in the eleventh edition of "Osler's Principles of Medicine," edited by McCrae on pages 302, 334, 378, 388, 394, 467, 479, 495, 558, 560, 634, 641, 735, 745, 834, 851, 867, 1103, 1112. Clue 30, "ague," will be sought in vain on pages 244–258. Other references: 32, "ale" (wife); 38 ac., "LM" (long metre); 4, "Bruno" (Lewis Carroll); 6, "MT" (empty) 45, "PT" ("apt" with A, unclued in both 50 and 34); 47 and 46, "Pell" (Charles Dickens).

Treatment of Malaria in Britain

Cases of malaria amongst service personnel in this country have prompted the Ministry of Health and the Department of Health for Scotland to invite the coöperation of retired medical officers of the colonial and fighting services in their diagnosis and treatment. Many civilian hospitals and practitioners suddenly faced with what is, in this country, a rare disease may be glad of the assistance of someone who has had experience of the disease in the tropics. Such help would probably only be called for infrequently, but it might then be urgently needed. The Ministry of Health and the Department of Health for Scotland would be grateful if any officer who can offer his services would send his name and home address to the director of establishments at the ministry, Caxton House, Tothill Street, London, S.W.1.

'GESTYL' (Organon), a preparation of gonadotrophic hormone from pregnant mare's serum containing either 200 or 400 international units per ampoule, is now made in England and adequate stocks are available.

Appointments

HUBBLE, D. V., MD LOND: asst. physician to the Derbyshire Royal Infirmary, Derby.

WALKER, G. F., MD LEEDS, MRCP: medical superintendent and physician at the Peterborough and District Memorial Hospital.

Births, Marriages and Deaths

BIRTHS

ACKROYD.—On Aug. 21, at Newcastle-on-Tyne, the wife of Surgeon-Lieutenant Anthony Ackroyd, RNVR—a son.

BARNES.—On Aug. 24, at Ipswich, the wife of Captain Clive Ormsby Barnes, RAMC (T)—a daughter.

DAVISON.—On Aug. 26, at Newcastle-on-Tyne, the wife of Dr. George Davison—a daughter.

FRAZER.—On Aug. 22, in London, the wife of Captain Simon McLeod Frazer, RAMC—a son.

HART.—On Aug. 22, the wife of Lieut.-Colonel T. N. Hart, RAMC, Astley House, Astley Bridge, Bolton—a son.

HOOTON.—On Aug. 24, at Southport, the wife of Captain W. F. Hooton, RAMC—a son.

KERSHAW.—On Aug. 28, at Adlington Hall, Cheshire, to Mary Cowell, MD, DMR, wife of Surgeon Lieutenant W. E. Kershaw, RNVR—a son.

LITCHFIELD.—On Aug. 25, in London, the wife of Lieutenant J. W. Litchfield, RAMC—a son.

MCGREGOR.—On Aug. 26, at Croydon, the wife of Dr. James St. McGregor—a daughter.

SMITH.—On Aug. 18, at Torquay, to Dr. Mary Smith (*née* Mellersh), wife of Flying-Officer W. T. Smith, RAFVR—a son.

MARRIAGES

RITCHIE—PORTER.—On Aug. 27, in London, Patrick John Emerton Ritchie, squadron-leader RAF, to Alison Crawford Porter Porter, MRCS, youngest daughter of Dr. Charles Porter, of Clifton Hill, St. John's Wood.

DEATHS

SPENCER EDWARDS.—On Aug. 21, at Halling, Rochester, Kent, John Clifton Spencer Edwards, MB EDIN.

WOODHOUSE.—On July 21, James Younger Woodhouse, MB DURH, surgeon-lieutenant RN, aged 39.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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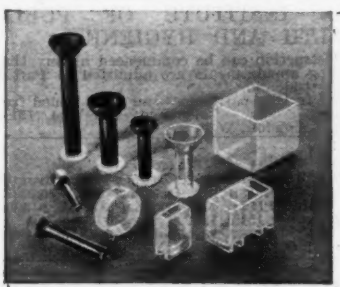

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Carrel and Dehelly Military Medical Manuals, "The Treatment of Infected Wounds," 2nd Edition (1918), p. 24.

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1. "*Treatment of Burns by Envelope Irrigation*," *British Medical Journal, July* 12*th*, 1941, *p.* 47.
2. "*Experiences in an E.M.S. Base Hospital in the London Area*," *Edinburgh Medical Journal, January*, 1942, *pp.* 25–26.

★ *For quotations for Bulk Supplies for Hospitals, etc., or information with regard to irrigation technique, write Milton Antiseptic Ltd., John Milton House, London, N.7.*

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Scholars may be Male or Female, and must hold a medical qualification registrable in the United Kingdom or a university degree.

Scholars must devote themselves to the investigation of some biological or clinical problem of disease as it occurs in man, with a view to the extension of surgical knowledge.

Facilities for laboratory research will be provided in the Bernhard Baron laboratories of the Royal College of Surgeons, now evacuated to Finchingfield, Essex.

Applications, stating the nature of the proposed research and accompanied by a recommendation from a member of the staff of the applicant's medical school or university, should be sent to the Bernhard Baron Research Professor, at Prospect House, Finchingfield, Braintree, Essex, before 19th September, 1942.

KENNEDY CASSELS, Secretary.

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The British Empire Cancer Campaign invites applications for the above Scholarship for part-time work. The subject of the research will be "Treatment of Pain with Special Reference to Pain due to Advanced Malignant Disease." A special knowledge of physiology would be desirable. The salary will be £100 per annum, and the successful candidate will be eligible for re-election. The Scholarship will be open to any member of the British Empire with a recognised medical or scientific degree.

Applications must be lodged with the Campaign by 1st October. Further particulars can be obtained from the GENERAL SECRETARY, BRITISH EMPIRE CANCER CAMPAIGN, 11, Grosvenor-crescent, Hyde Park Corner, London, S.W.1.

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BRITISH POSTGRADUATE MEDICAL SCHOOL

(UNIVERSITY OF LONDON)

WAR SURGERY OF THE EXTREMITIES

21st to 25th September, 1942

Monday, 21st Sept.	10 A.M.	General Principles of War Surgery of the Limbs.	Major-Gen. Mitchiner, C.B.E., T.D., F.R.C.S.
	11.15 A.M.	Administrative Problems in War Surgery.	Prof. G. Grey Turner, LL.D., D.Ch., M.D., F.R.C.S.
	2 P.M.	Traumatic Arterial Spasm	Mr. Sol M. Cohen, M.S., M.B., F.R.C.S.
	3.15 P.M.	Pathology of War Wounds of the Extremities.	Major R. Raven, F.R.C.S.
Tuesday, 22nd Sept.	10 A.M.	Wounds of the Extremities with or without Fractures.	Lt.-Col. A. W. M. White, R.C.A.M.C.
	1.30 P.M.	Radiological Investigation of Wounds of the Extremities.	Major J. Duncan White, M.B., Ch.B., D.M.R.E.
	2.30 P.M.	Shock	Dr. J. McMichael, M.D., F.R.C.P., F.R.S.E.
Wednesday, 23rd Sept.	10 A.M.	War Burns	Mr. E. E. Lewis, F.R.C.S.
	11.15 A.M.	Wounds of Joints	Mr. Z. Cope, M.S., F.R.C.S.
	1.45 P.M.	Amputations	Mr. Jenner Verrall, F.R.C.S.
	2.45 P.M.	Demonstration.	
Thursday, 24th Sept.	10 A.M.	Infections	Prof. J. Paterson Ross, F.R.C.S.
	11.15 A.M.	Blood Transfusion	Dr. Janet Vaughan, D.M., F.R.C.P.
	1.30 P.M.	Tetanus	Dr. Leslie Cole, M.D., F.R.C.P.
	2.30 P.M.	Demonstration of Plaster Technique.	Mr. G. C. Dorling, F.R.C.S.
Friday, 25th Sept.	10 A.M.	Secondary Hæmorrhage ..	Surgeon Rear-Admiral Gordon-Taylor, O.B.E., M.S., F.R.C.S.
	11.15 A.M.	Traumatic Aneurysm ..	Surgeon Rear-Admiral Gordon-Taylor, O.B.E., M.S., F.R.C.S.
	2 P.M.	Injuries of Hands and Feet	Major Duncan Croll, M.D., C.M. (McGill), F.A.C.S., R.C.A.M.C.
	3 P.M.	Gas Gangrene and other Anaerobic Infections.	Mr. G. T. Mullally, M.C., M.S., F.R.C.S.

The fee for the Course will be one guinea, but no fee will be charged in the case of Officers of the Armed Forces who are nominated for the course by their respective Director-Generals. Applications for admission should be addressed to the DEAN, British Postgraduate Medical School, Ducane-road, W.12.

Further War Courses will commence as follows:—

SURGICAL CARE OF THE SOLDIER IN TRAINING	MONDAY, 5TH OCTOBER.
WAR SURGERY OF THE ABDOMEN ..	MONDAY, 19TH OCTOBER.
WAR MEDICINE COURSE	MONDAY, 2ND NOVEMBER.

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L. M. S. S. A.

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MEDICAL PROSPECTUS (36 pages)

sent gratis, along with List of Tutors, &c., on application to the Principal, 17, Red Lion-square, London, W.C.1. (Telephone: HOLborn 6813.)

King Edward Memorial Hospital,

EALING.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT SURGICAL OFFICER (B1), vacant on the 3rd October, 1942. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. Salary at the rate of £275 per annum, with full residential emoluments.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of two recent testimonials, should be sent immediately to: R. A. MICKELWRIGHT, House Governor.

The South London Hospital for

WOMEN, Clapham Common, S.W.4.

Applications are invited from registered medical Female practitioners for the undermentioned appointments, vacant on 1st October :—

(1) HOUSE SURGEON (A), including practitioners within three months of qualification and liable under the National Service Acts, 1939–41. The appointment will be for a period of six months. Salary is at the rate of £100 per annum, with full residential emoluments.

(2) RESIDENT MEDICAL OFFICER (B1). Applicants should have held house appointments. W practitioners holding A or B2 posts may also apply. Salary is at the rate of £200 per annum, with full residential emoluments.

Applications, stating age, nationality, qualifications with dates, and accompanied by copies of three recent testimonials, should be sent to the SECRETARY at the Hospital by Saturday, 12th September.

Willesden General Hospital,

Harlesden-road, N.W.10.

Applications are invited from registered medical practitioners for the following appointments, to become vacant on the 1st October, 1942 :—

CASUALTY OFFICER (B2). Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply when appointment will be limited to six months. Salary is at the rate of £175 per annum, with full residential emoluments.

HOUSE SURGEON (A), including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months. Salary is at the rate of £130 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, nationality, present post, and accompanied by copies of three recent testimonials, should be sent not later than the 11th September, 1942, to: J. N. DRAKE, Secretary.

The Prince of Wales's General HOSPITAL, London, N.15.

Applications are invited for the appointment of TEMPORARY HONORARY ASSISTANT SURGEON to the GENITO-URINARY DEPARTMENT. Applicants must be Fellows of the Royal College of Surgeons of England, and must be engaged in consulting practice only.

Applications, together with copies of three recent testimonials, should reach the undersigned on or before 9th September, 1942.

J. C. BURDETT, Director and House Governor.

11th August, 1942.

Examining Surgeons: FACTORIES ACT, 1937.

The following appointments as Examining Surgeon under the Factories Act, 1937, are vacant.

Applications should be sent to the CHIEF INSPECTOR OF FACTORIES, 28, Broadway, London, S.W.1.

District	*County*	*Latest date for receipt of application.*
BEBINGTON ..	CHESTER	15th September, 1942.
GOSPORT ..	SOUTHAMPTON ..	15th September, 1942.

London County Council.

Medical practitioners required for undermentioned positions Married quarters not available.

TEMPORARY ASSISTANT MEDICAL OFFICERS, Class I (B1). Salary £350–£25–£425.

ST. PANCRAS HOSPITAL, 4, St. Pancras-way, N.W.1. .. Surgical duties.

HIGHGATE HOSPITAL, Dartmouth Park Hill, N.19.
ST. MARY ABBOTS HOSPITAL, Marloes-road, Kensington, W.8. } Medical duties.

COLINDALE HOSPITAL, The Hyde, N.W.9. .. Experience and treatment of tuberculosis required.

*ST. BENEDICT'S HOSPITAL, Church-lane, Tooting, S.W.17. .. General medical duties.

* Women applicants only; additional allowance of £50 a year as Deputy Medical Superintendent.

R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply.

TEMPORARY ASSISTANT MEDICAL OFFICERS, Class II (B2). Salary £250.

DULWICH HOSPITAL, East Dulwich-grove, S.E.22. .. General medical duties.

ST. ALFEGE'S HOSPITAL, Vanbrugh Hill, S.E.10. .. Medical duties with obstetrics.

†Various Hospitals for Infectious Diseases.

R practitioners qualified more than three months cannot be considered unless they have been rejected by the R.A.M.C. If held by a practitioner (Male or Female) liable under the National Service Acts, 1939–41, the appointment will be limited to six months.

† Officers are eligible for promotion to Class I (B1) (temporary), after a minimum period of six months' service.

All the above positions are with board, lodging, and washing.

Application forms obtainable (stamped foolscap envelope necessary) from the MEDICAL OFFICER OF HEALTH (S.D.2), County Hall, S.E.1, returnable by 21st September. Canvassing disqualifies.

Royal National Throat, Nose and Ear HOSPITAL, Gray's Inn-road, W.C.1.

ASSISTANTS IN THE OUT-PATIENT DEPARTMENT.

There are vacancies for attendance at the following Clinics:—MONDAYS, 10 A.M. and 2 P.M.; TUESDAYS, 10 A.M.; WEDNESDAYS, 10 A.M. and 2 P.M.; THURSDAYS, 2 P.M.

The appointments, which are honorary, afford good opportunities of acquiring an extended knowledge of the specialty as the duties consist of assisting the Surgeons in the treatment of patients.

Applications, which may be for attendance at one or more of the above-mentioned times, should be sent immediately to—JOHN H. YOUNG, Secretary-Superintendent.

Royal Free Hospital, Gray's Inn-road, W.C.1.

Applications are invited from registered medical practitioners for the appointment of RESIDENT ASSISTANT MEDICAL REGISTRAR (B1). The duties will comprise mainly those of Casualty Officer. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. Salary £350 per annum, payable by the Ministry of Health.

Applications, stating age and accompanied by copies of three recent testimonials, should be sent to the undersigned (from whom all information may be obtained) on or before 19th September, 1942. RICHARD T. BARTLEY, Secretary.

Queen Mary's Hospital for the EAST END, Stratford, E.15.

Applications are invited for the post of SURGEON in charge of the EAR, NOSE, AND THROAT DEPARTMENT of the above Hospital. Candidates must be Fellows of a Royal College of Surgeons engaged in consulting practice as an Aural Specialist. The appointment in the first instance will be for the duration of the war.

Applications to be sent not later than Tuesday, the 15th of September, 1942, to: BERNARD T. HEMPEL, Captain, Chairman.

Royal Berkshire Hospital, Reading.

The Board of Management invites applications from medical practitioners, engaged exclusively in the practice of physical medicine, for the post of HONORARY PHYSICIAN in charge of the ELECTROTHERAPEUTIC AND MASSAGE DEPARTMENT. Candidates must be medical graduates of one of the universities of the British Empire and their names entered on the Medical Register. The appointment is temporary and is terminable within twelve months of the conclusion of hostilities. The elected candidate will be appointed for the period ending on the third Tuesday in January, 1943, and will be eligible for re-election.

Canvassing on the part of a candidate or on his behalf will disqualify him. The person appointed will not be required to live in Reading.

Candidates are required to provide six copies of their application and testimonials, which must be addressed to the Secretary and reach him not later than 9 A.M. on Friday, 25th September, 1942. The election will be held on 6th October, 1942.

By Order,
H. E. RYAN, Secretary and House Governor.

Nottingham City Council.

FIRS MATERNITY HOSPITAL. (40 Beds.)

Applications are invited from registered medical practitioners, Male, for the appointment of RESIDENT OBSTETRIC HOUSE SURGEON (B2), vacant towards the end of September. Salary is at the rate of £300 per annum, with full residential emoluments. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41, but rejected by the R.A.M.C., may also apply, when appointment will be limited to six months, otherwise renewable for a further six months subject to satisfactory service.

Applications, stating age, qualifications with dates, and nationality, should be accompanied by copies of three testimonials and sent forthwith to: J. E. RICHARDS, Town Clerk.

Guildhall, Nottingham, 26th August, 1942.

County Borough of Preston. SHAROE GREEN HOSPITAL. (250 Beds.)

Applications are invited from registered Women medical practitioners for the appointment of JUNIOR RESIDENT MEDICAL OFFICER (A), including W practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months; otherwise not exceeding twelve months. Salary £150 per annum, with full residential emoluments.

Applications, stating age, nationality, and qualifications with dates, and copies of three recent testimonials, to be forwarded to the MEDICAL SUPERINTENDENT, Sharoe Green Hospital, Fulwood, Preston.

West Suffolk General Hospital, BURY ST. EDMUNDS. (415 Beds.)

Applications are invited from registered medical practitioners, Male or Female, for the following A appointments, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointments will be for six months:—

HOUSE PHYSICIAN, vacant on 1st October. Salary is at the rate of £150 per annum, with full residential emoluments.

HOUSE SURGEON AND RESIDENT OBSTETRICIAN, vacant on 26th September. Salary is at the rate of £150 per annum, with full residential emoluments.

Applications, stating age, experience, qualifications, and nationality, should be sent, accompanied by copies of three recent testimonials to: E. E. HARDWICKE, Secretary.

29th August, 1942.

Derbyshire Royal Infirmary, Derby. (Voluntary Hospital. Total Beds 646.)

Applications are invited from registered medical practitioners (Male and Female) for the appointment of a CASUALTY OFFICER (A), vacant immediately, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months. Salary is at the rate of £150 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to—

ARTHUR TAYLOR, Superintendent and Secretary.

Cheshire County Council.

WEST PARK (COUNTY) GENERAL HOSPITAL, MACCLESFIELD.

JUNIOR RESIDENT ASSISTANT MEDICAL OFFICER (A) (MALE OR FEMALE).

Applications are invited from registered medical practitioners (Male or Female), including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months, otherwise it may be renewed for a further six months, for the above appointment at a salary of £200 per annum, together with the usual residential allowances.

Applications to be made on forms obtainable from the undersigned and returned not later than the 14th September, 1942.

IAN MACKAY, County Medical Officer of Health.
County Public Health Department, 24, Nicholas-street, Chester.

HIS MAJESTY'S COLONIAL SERVICE

THE COLONIAL MEDICAL SERVICE

VACANCIES FOR MEDICAL OFFICERS

The maintenance of an efficient Colonial Medical Service constitutes a vital part of the national war effort and it is most important that the Service should be assured of an adequate supply of doctors.

The Secretary of State for the Colonies therefore invites applications from doctors possessing a medical qualification registrable in the United Kingdom who are British subjects and who are under thirty-five years of age.

Medical Officers are appointed in the first instance for general service. But there are ample opportunities for work in special branches of medicine and surgery, in public health and in medical research.

The normal salary scale is from £600 to between £1,000 and £1,120. There are large numbers of super-scale posts to which promotion is made on merit and which carry higher salaries.

Government quarters, in many cases free of rent, and first-class passages to and from the Colonies are provided, and an adequate pension scheme is in force.

Selected candidates are normally required to attend a course of instruction in Tropical Medicine and Hygiene either before proceeding overseas or during their first period of leave.

Further particulars, including the regulations governing admission to the Colonial Medical Service, may be obtained from the Director of Recruitment (Colonial Service), 2, Park-street, London, W.1.

Northumberland County Council.

Applications are invited for the post of ASSISTANT COUNTY MEDICAL OFFICER at the scale salary of £500 per annum, rising by annual increments of £25 to £700 per annum. Previous experience in a similar post will be taken into consideration in determining the commencing salary. Travelling and subsistence allowances will be paid in accordance with the Council's scale. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination. The officer appointed must devote the whole of his time to his duties and may be required to undertake any duties in the Health Department, including work in connexion with the Civil Defence Services and with the care of mental defectives.

Forms of application may be obtained from the undersigned, and applications should be received not later than 21st September, 1942. C. HAROLD CARTER, Clerk of the County Council.

New Senior School, Mitford-road, Morpeth, Northumberland.

Cheshire County Council.

CLATTERBRIDGE (COUNTY) GENERAL HOSPITAL, BEBINGTON, WIRRAL.

JUNIOR RESIDENT ASSISTANT MEDICAL OFFICER (B2) (MALE).

Applications are invited from registered medical practitioners for the above appointment at a salary of £200 per annum, together with the usual residential allowances. There is a Non-resident Medical Superintendent, a Resident Deputy Medical Superintendent, and Consulting Staff from Teaching Hospitals. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41, but rejected by the R.A.M.C., may also apply, when appointment will be limited to six months, otherwise it may be renewed for a further six months.

Applications to be made on forms obtainable from the undersigned and returned not later than the 14th September, 1942.

IAN MACKAY, County Medical Officer of Health.

County Public Health Department, 24, Nicholas-street, Chester.

County Infirmary, Cambridge.

Immediate applications are invited for the appointment of a HOUSE SURGEON (A) at the County Infirmary, Cambridge, a public assistance institution up-graded as a Class I Hospital. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may apply when appointment will be for six months; otherwise for twelve months. The total number of beds available is 259; about 200 beds are occupied at the present time. Salary at the rate of £120 per annum, with board, residence, and laundry.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of recent testimonials, should be sent at once to the CLERK of the Cambridgeshire County Council, Shire Hall, Castle Hill, Cambridge.

Shire Hall, Cambridge, 25th August, 1942.

City of Portsmouth.

SAINT MARY'S HOSPITAL. (1050 Beds.)

Applications are invited from Male registered medical practitioners for the appointments of Two JUNIOR RESIDENT MEDICAL OFFICERS (A posts), vacant shortly, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointments will be for six months; otherwise for twelve months. The salary is at the rate of £250 per annum, with full residential emoluments valued at £125 per annum, and a temporary cost-of-living bonus, according to the Whitley Council Scale, at present at the rate of 6s. 6d. per week.

Application forms may be obtained from, and must be returned to, the Medical Officer of Health, Northern Secondary School, Mayfield-road, Portsmouth.

F. J. SPARKS, Town Clerk.

Municipal Offices, Royal Beach Hotel, Southsea, 28th August, 1942.

Grimsby and District Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the following appointments, to become vacant on 30th September, 1942:—

RESIDENT CASUALTY OFFICER AND HOUSE SURGEON (A), including practitioners within three months of qualification and liable under the National Service Acts, 1939–41. Appointment for six months. Salary at the rate of £175 per annum, with full residential emoluments.

RESIDENT ORTHOPÆDIC OFFICER (B2). Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply. Appointment for six months. The salary is at the rate of £275 per annum, with full residential emoluments.

Applications, stating age, nationality, qualifications, and copies of recent testimonials, to the SECRETARY-SUPERINTENDENT.

13th August, 1942.

Hull Royal Infirmary.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of CASUALTY OFFICER (A), vacant November. Applicants may include practitioners within three months of qualification and liable under the National Service Acts, 1939-41, when appointment will be for six months. Salary is at the rate of £200 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of recent testimonials, should be addressed to: R. J. CARLESS, House Governor.

Nottingham and Midland Eye Infirmary.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a HOUSE SURGEON (B1). Applicants should have had some surgical ophthalmic experience. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may apply. Salary according to experience, minimum £200, with full residential emoluments.

Applications, stating age, nationality, qualifications, and experience, with copies of three recent testimonials, immediately to: T. RUSSELL MOORE, Secretary.

The Ropewalk, Nottingham.

Cheltenham Hospital.

Applications invited from registered medical practitioners for appointment of HOUSE SURGEON (A), vacant immediately, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months. Salary at rate of £200 per annum, with full residential emoluments.

Applications should be sent immediately to County Medical Officer of Health, 18, Berkeley-street, Gloucester.

RICHARD L. MOON, Clerk of the Gloucestershire County Council.

De-la-Pole Hospital

(FOR NERVOUS AND MENTAL DISORDERS), WILLERBY, Near HULL.

Required immediately TEMPORARY MEDICAL OFFICER (B1) (Male or Female) to replace one called up. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. Salary £8 8s. per week, plus full residential emoluments.

Apply MEDICAL SUPERINTENDENT.

St. Audry's Hospital, Melton,

WOODBRIDGE, SUFFOLK.

TEMPORARY ASSISTANT MEDICAL OFFICER (B1) (Male) required for the above, which is the County Mental Hospital and also a Class 1A Hospital with 100 Beds. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. Salary 8 guineas per week, with board-residence.

Apply MEDICAL SUPERINTENDENT and enclose copies of two testimonials.

Royal Sheffield Infirmary and HOSPITAL.

THE ROYAL INFIRMARY, SHEFFIELD, 6.

Applications are invited from registered medical practitioners, Male and Female, for the following appointments, tenable for six months :—

CASUALTY OFFICER (B1), now vacant.
HOUSE PHYSICIAN (A) } vacant on 1st October.
HOUSE SURGEON (A) }

Applicants for the B1 appointment should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. Salary is at the rate of £150 per annum.

Applications for the A appointments include practitioners within three months of qualification and liable under the National Service Acts, 1939–41. Salary is at the rate of £80 per annum, with full residential emoluments, and a bonus of £20 payable at the expiration of six months' satisfactory service.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, if any, and accompanied by copies of three recent testimonials, should be sent forthwith to— H. KINGSLEY PEARCE,
General Superintendent and Secretary.

The Royal Infirmary, Sheffield, 6, 27th August, 1942.

The Robert Jones and Agnes Hunt ORTHOPÆDIC HOSPITAL, OSWESTRY.

VISITING RADIOLOGIST.

Applications are invited for the above-mentioned appointment. Honorarium £150 per annum.

Particulars may be obtained from the SECRETARY-SUPERINTENDENT, to whom applications should be addressed stating experience and accompanied by testimonials.

The Robert Jones and Agnes Hunt ORTHOPÆDIC HOSPITAL, OSWESTRY, SHROPSHIRE.

Applications are invited from registered medical practitioners (Male) for the appointment of a HOUSE SURGEON (A), now vacant, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months. Salary is at the rate of £200 per annum, with full residential emoluments.

Applications, stating age, nationality, qualifications, &c., with copies of recent testimonials, to be forwarded at once to the SECRETARY-SUPERINTENDENT.

Royal Salop Infirmary, Shrewsbury.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT HOUSE SURGEON (B2), vacant on 12th October. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply when appointment will be limited to six months. The salary is at the rate of £160 per annum, with full residential emoluments.

Applications, stating age, nationality, qualifications, and accompanied by copies of testimonials, to—
J. W. NOBLE, Secretary-Superintendent.

Board Room, 25th August, 1942.

The Royal Liverpool Children's HOSPITAL, HESWALL, CHESHIRE.

RESIDENT SURGICAL OFFICER (A).

Applications are invited from registered medical practitioners, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, for the above appointment at the HESWALL (COUNTRY) BRANCH (260 Beds). Salary at the rate of £120 per annum. The appointment will be for six months from 1st October, 1942.

Applications, stating age, qualifications with dates, and nationality, accompanied by copies of three recent testimonials and the name of a referee, should be sent to the SECRETARY, Royal Liverpool Children's Hospital, Myrtle-street, Liverpool, 7, by Monday, 14th September, 1942.

County Borough of West Bromwich.

ASSISTANT MEDICAL OFFICER OF HEALTH AND ASSISTANT SCHOOL MEDICAL OFFICER.

Applications are invited for the above whole-time appointment. The appointment is temporary for the duration of the war and will be reviewed for permanency thereafter.

Applicants must be registered medical practitioners, preferably holding the D.P.H. and with experience in refractions, and have had at least two years' experience since qualification. The duties will include general public health, school medical work, and any other duties as may be allocated by the Medical Officer of Health, including civil defence. Salary £600 per annum, rising by annual increments of £25 to £700, and a car allowance.

(The post of Deputy Medical Officer will become vacant in the near future.)

Applications, stating qualifications and experience in detail, with three copies of recent testimonials, should be forwarded to the undersigned to arrive not later than 16th September, 1942.

There are no special application forms.

W. S. WALTON, Medical Officer of Health.

Health Department, 2, Lodge-road, West Bromwich,
29th August, 1942.

Heckmondwike and Mirfield Urban DISTRICT COUNCILS. COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE.

JOINT APPOINTMENT OF MEDICAL OFFICER OF HEALTH AND ASSISTANT COUNTY MEDICAL OFFICER.

Applications are invited from registered medical practitioners holding the Diploma in Public Health, or its equivalent, for the above-named whole-time appointment, subject to the provisions of the Sanitary Officers (Outside London) Regulations, 1935, and the Local Government Act, 1933. The salary attached to the post is £800 per annum, advancing, subject to satisfactory service, by annual increments of £50 to a maximum of £1000 per annum, together with an allowance for travelling expenses of £50 per annum. Office accommodation and any necessary clerical assistance will be provided or, if necessary, an allowance will be made for their provision.

The appointment will be made jointly by the District Councils and the County Council, and the person appointed will not be permitted to engage in private practice and will be required—

(*a*) To reside either in Heckmondwike or Mirfield, or within such distance therefrom as may be approved ;
(*b*) As Medical Officer of Health of the Urban Districts of Heckmondwike and Mirfield to act under the control and direction of the respective District Councils and to perform all the duties imposed on a Medical Officer of Health by the relevant Acts and Orders ;
(*c*) To act as Medical Officer of the Maternity and Child Welfare Services of the Heckmondwike Urban District Council ;
(*d*) As Assistant County Medical Officer to act under the direction and control of the County Medical Officer, and to carry out duties relating to school medical examination, medical examination of defectives, and certain maternity and child welfare work, and such other duties on behalf of the County Council as may be deemed necessary from time to time ;
(*e*) To undertake such other duties, not being incompatible with the above, as the Councils may jointly decide upon, and appropriate duties in connexion with Air Raid Precautions.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and to the successful candidate passing a medical examination as to his physical fitness.

Forms of application may be obtained from either of the undersigned, and completed forms, accompanied by copies of not more than three recent testimonials, must be delivered to Mr. F. L. Parker, Clerk to the Mirfield Urban District Council, Council Offices, Mirfield, not later than 19th September, 1942.

Canvassing of members of the appointing bodies, directly or indirectly, will disqualify any candidate for the appointment.

GEORGE HOLT,
Clerk to the Urban District Council of Heckmondwike.
FRANK L. PARKER,
Clerk to the Urban District Council of Mirfield.

31st August, 1942.

City of Manchester.

PUBLIC HEALTH DEPARTMENT.

Applications are invited from qualified medical practitioners for the post of ASSISTANT PATHOLOGIST (Temporary) in the Manchester Municipal Hospitals Pathological Service. The post is full time, non-resident, and the salary offered is £600 per annum, subject to the Manchester Corporation conditions of service. Any fees received must be refunded to the Corporation. Applicants should have good practical experience in all branches of clinical pathology.

Particulars may be obtained from the Director of Pathological Services, Pathological Laboratory, Crumpsall Hospital, Manchester, 8, and applications for the post must be received by him not later than 17th September, 1942.

Canvassing in any form is prohibited.

R. H. ADCOCK, Town Clerk.

Town Hall, Manchester, 2, 27th August, 1942.

University of Birmingham.

The Council invites applications from registered medical practitioners (Male) for the post of MEDICAL OFFICER to th University, the appointment to be taken up on 1st October, 1942. Salary £750 per annum. The Medical Officer will be responsible for the medical examination of undergraduates in the University and will act as Medical Adviser to the Physical Education Department. He will be expected to undertake research work arising from these duties.

Further particulars of the appointment may be obtained from the undersigned, to whom applications (three copies) must be submitted, with the names of three referees, on or before 12th September, 1942. C. G. BURTON, Secretary.

The University, Edmund-street, Birmingham, 3,
August, 1942.

Royal Infirmary, Preston, Lancs.

The Board of Management invite applications for the post of BIOCHEMIST, to work in the DEPARTMENT OF PATHOLOGY under the direction of the Pathologist. Applicants should hold a degree in Natural Science. Salary according to experience (but not less than £300 per annum), with the chance of increments after probation.

Forms of application will be supplied on request to the PATHOLOGIST.

Borough of Brighouse.

Applications are invited for the position of MEDICAL OFFICER OF HEALTH, School Medical Officer and Medical Superintendent of the Corporation's Infectious Diseases Hospital.

The salary will be £950 per annum. A cost of living bonus is also paid in accordance with the recommendation of the National Joint Council for Local Authorities Administrative Technical and Clerical Services.

The Medical Officer of Health will be assisted by a whole-time Assistant Medical Officer of Health and Assistant School Medical Officer, a dentist who is employed almost whole-time, the usual nursing, sanitary and clerical staffs, and the following part-time officers:

Consulting Obstetrician and Gynæcologist, Orthopædic Surgeon, School Oculist, Orthoptist and Medical Gymnast.

The Medical Officer of Health will control 3 Maternity and Child Welfare Centres, 3 War-time Nurseries, and domiciliary midwifery and home help schemes. The Fever Hospital has accommodation for a maximum of 60 patients. There is an open-air school.

Candidates for the appointment must be qualified Medical Practitioners and registered in the Medical Register as holders of Diplomas in Sanitary Science, Public Health or State Medicine.

The position will be subject to the Council's Conditions of Service, to the passing of a medical examination, to the Local Government Superannuation Act, 1937, to the Sanitary Officers (Outside London) Regulations, 1935, and to the three months' notice. A copy of the Conditions of Appointment and a form of application may be obtained from the undersigned.

Applications on the prescribed form, accompanied by copies of not more than three recent testimonials, in envelopes endorsed "Medical Officer of Health" must be delivered to the undersigned not later than the first post on Monday, 21st September, 1942.

Canvassing either directly or indirectly is strictly prohibited and applicants should disclose in writing to the Town Clerk whether to their knowledge they are related to any member of, or the holder of any senior Office under, the Council.

ERNEST H. CLEGG, Town Clerk.

Town Hall, Brighouse, August, 1942.

Surrey County Council.

Applications are invited for the posts of TUBERCULOSIS OFFICERS (two vacancies). The posts are temporary, and will be for the duration of the absence of the permanent officers on war service. The appointments will be subject to satisfactory medical examination and to one month's notice on either side. The salary will be a fixed one on the scale of £750 to £950 per annum, according to qualifications and experience. Candidates must be registered medical practitioners and have held resident appointment in a general hospital for at least six months, and have had special practical experience in the diagnosis and treatment of tuberculosis in sanatoria or otherwise. The officers appointed will be required to devote their whole time to their official duties, and to work under the administrative control of the County Medical Officer of Health, and to reside in such district as may be required. The duties will include the charge of tuberculosis dispensaries, the general arrangement for the treatment of tuberculosis patients otherwise than in sanatoria, and such other duties as the Council may direct, including part charge of a 50-bed chest unit in a large general hospital.

Applications, stating age, qualifications, and experience, together with copies of not more than three recent testimonials, must be sent to the COUNTY MEDICAL OFFICER OF HEALTH, County Hall, Kingston-upon-Thames, from whom further particulars may be obtained. Special forms of application are not supplied. Envelopes must be endorsed "Tuberculosis Officer." Canvassing, directly or indirectly, will be a disqualification. The last date for receipt of applications is first post on Friday, the 11th September.

The Southampton Children's Hospital

AND DISPENSARY FOR WOMEN.

Applications are invited from registered medical practitioners, Male or Female, for the appointment of a RESIDENT MEDICAL OFFICER (A), now vacant, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months. Salary is at the rate of £150 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by three recent testimonials, should be sent immediately to: ELLA K. MATTHEWS, Secretary.

The Children's Hospital, Sheffield

(INC.) (157 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A) vacant 1st October, including practitioners within three months of qualification and liable under the National Service Acts 1939–41, when the appointment will be for a period of six months. Salary is at the rate of £100 per annum with full residential emoluments.

Applications, stating age, nationality, qualifications, and accompanied by copies of three recent testimonials should be sent to the undersigned.

The successful applicant must be a member of a Medical Defence Society.

T. H. G. GARTLAND, Superintendent and Secretary.

County Borough of Middlesbrough.

HEALTH DEPARTMENT.
WEST-LANE ISOLATION HOSPITAL.

APPOINTMENT OF RESIDENT MEDICAL OFFICER (B1).

Applications are invited from registered medical practitioners for the above post. Experience is afforded in the post for all forms of infectious diseases and tuberculosis. The appointment is for the duration of the war. The successful applicant will also be required to undertake duties in infant welfare clinics and any other additional duties in the Health Department which may be required by the Medical Officer of Health. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. The salary is at the rate of £350 per annum, rising by annual increments of £25 to a maximum of £450, plus the usual residential emoluments. The appointment is subject to the Council's Staff Regulations and will be terminable by one month's notice on either side.

Applications should be endorsed "Resident Medical Officer," and sent to the Medical Officer of Health, Municipal Buildings, Middlesbrough, on or before the 14th September, 1942.

PRESTON KITCHEN, Town Clerk.

Municipal Buildings, Middlesbrough, 24th August, 1942.

City of Birmingham.

DUDLEY-ROAD HOSPITAL. (926 Beds.)

Applications are invited from registered medical practitioners, Male or Female, for the appointment of TEMPORARY RESIDENT SURGICAL OFFICER (B1). Applicants should have held house appointments and had surgical experience, and must either hold the F.R.C.S. (England or Edinburgh) or be preparing for such an examination. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. The salary is at the rate of £10 10s. per week, plus residential emoluments.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent to the MEDICAL OFFICER OF HEALTH, Council House, Birmingham, 3, not later than the 9th September, 1942.

County Council of the West Riding of YORKSHIRE.

MIDDLETON-IN-WHARFEDALE SANATORIUM AND HOSPITAL. (600 Beds.)

Applications are invited from registered medical practitioners for the post of TEMPORARY DEPUTY MEDICAL SUPERINTENDENT (Resident) at the Middleton-in-Wharfedale Sanatorium and Hospital, near Ilkley. Candidates must have held resident hospital appointments and have had experience in the diagnosis and treatment of tuberculosis. Possession of a higher qualification in medicine will be considered an advantage. Salary £450, rising by increments of £25 to £550, together with the usual residential allowances.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to the County Medical Officer, County Hall, Wakefield, not later than 9th September, 1942.

CHARLES MCGRATH, Clerk of the County Council.

County Hall, Wakefield, August, 1942.

Bedford County Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a HOUSE SURGEON (A), vacant approximately the 1st October, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be limited to six months. The salary is at the rate of £150 per annum, with full residential emoluments.

Applications, stating age, nationality, qualifications, and accompanied by copies of testimonials, to the SECRETARY.

West Cornwall Hospital, Penzance.

(184 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a HOUSE SURGEON (A), to become vacant on the 14th September, 1942, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months. Salary is at the rate of £150 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to—

K. I. NEWELL, Secretary-Superintendent.

City of Carlisle.

CITY GENERAL AND FUSEHILL HOSPITALS.
(250 Beds.)

Applications are invited from registered medical practitioners, Male, for the appointment of JUNIOR MEDICAL OFFICER (A) (Fourth Resident), to become vacant on 12th September, 1942, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months; otherwise twelve months. Salary is at the rate of £160 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to the MEDICAL OFFICER OF HEALTH, 22, Fisher-street, Carlisle, as early as possible.

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Hampshire County Council.

THE COUNTY COUNCIL HOSPITAL, ST. PAUL'S HILL, WINCHESTER.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of ASSISTANT RESIDENT MEDICAL OFFICER (B2), vacant in the near future. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply when appointment will be limited to six months; otherwise to twelve months. The salary is at the rate of £350 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of three recent testimonials, should be sent as soon as possible to—

H. LESLIE CRONK, County Medical Officer.

The Castle, Winchester.

General Hospital, Nottingham.

(535 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT ANÆSTHETIST (B1), vacant shortly. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. The salary is at the rate of £300 per annum, with full residential emoluments.

Applications, stating age, nationality, qualifications, and accompanied by copies of testimonials, to—

HENRY M. STANLEY, House Governor and Secretary.

Royal Sussex County Hospital,

BRIGHTON. (375 Beds.)

Applications are invited from registered medical practitioners (Male) for the appointment of a CASUALTY HOUSE SURGEON (A), to become vacant on 17th October, 1942, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months; otherwise for at least six months. Salary is at the rate of £120 per annum, with full residential emoluments.

Applications, stating age, nationality, qualifications, and copies of testimonials, to—

L. L. W. LANCASTER-GAYE, Secretary-Superintendent.

Royal Hampshire County Hospital,

WINCHESTER. (462 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), to become vacant in September, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months. Salary is at the rate of £170 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, should be sent immediately to—

H. EWART MITCHELL, Superintendent and Secretary.

24th August, 1942.

Royal Infirmary, Bradford.

Applications are invited from registered medical practitioners (Male, single) for the appointment of HOUSE SURGEON (B2), vacant on 31st October. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41, cannot be considered unless rejected by the R.A.M.C. Six months' appointment. Salary £150 per annum, with full residential emoluments. There are 345 Beds and eight Resident Officers.

Applications, stating age, nationality, qualifications, and previous experience, with copies of three recent testimonials, should be sent immediately to—

H. TRUSSON, House Governor and Secretary.

26th August, 1942.

Lord Mayor Treloar Cripples'

HOSPITAL, ALTON, HANTS. (400 Beds.)

Required on 1st October for the post of THIRD RESIDENT MEDICAL OFFICER (A) (Male and unmarried). Salary at the rate of £200 per annum with usual emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointment will be for six months.

Apply, with copies of three testimonials, to the MEDICAL SUPERINTENDENT at the Hospital.

Winwick Hospital, Warrington.

Applications are invited, for two vacancies, from medical practitioners (Male or Female), including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months, otherwise not exceeding twelve months, for the post of JUNIOR HOUSEMAN (A), at a salary of £120 per annum, with board, residence, and laundry. The duties are mainly in connection with Orthopædic, Neuro-Surgical and Peripheral Nerve Injury cases.

Applications, stating age, qualification with dates, nationality, and accompanied by copies of three recent testimonials, should be sent, as soon as possible, to the Medical Superintendent.

City of Leicester.

CITY ISOLATION HOSPITAL, GROBY ROAD.

Applications are invited from registered medical practitioners for the appointment of RESIDENT MEDICAL OFFICER (B1). Applicants should have had experience in the treatment of infectious diseases and/or tuberculosis. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. The salary is at the rate of £350 per annum, rising by increments of £25 per annum to £450 per annum (plus at the present time a war-time bonus), with full residential emoluments.

Applications (on forms to be obtained from this office), accompanied by copies of three recent testimonials, should be returned not later than the 12th September, 1942, endorsed "R.M.O., City Isolation Hospital," and addressed to—

E. K. MACDONALD, Medical Officer of Health.

Health Department, Grey Friars, Leicester.

County Borough of Burnley.

MUNICIPAL GENERAL HOSPITAL.

Applications are invited from registered medical practitioner for the appointment of SURGICAL OFFICER (B1), vacant on 23rd November, 1942. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding the diploma of F.R.C.S. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply. Salary £750 per annum, rising, subject to satisfactory service, by £25 per annum to £850 per annum, plus war bonus of £40 10s. Commencing salary will be fixed according to the qualifications and experience of the successful applicant.

Forms of application and further particulars may be obtained from the Medical Officer of Health, Public Health Department, St. James's Street, Burnley, to whom applications should be returned, duly completed and accompanied by copies of three recent testimonials, not later than Wednesday, 23rd September, 1942.

ARCHIBALD GLEN, Town Clerk.

Town Hall, Burnley, 31st August, 1942.

The Bolton Royal Infirmary.

(245 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the following appointments vacant on 30th September, 1942.

HOUSE PHYSICIAN (B2). Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.) may also apply, when appointment will be limited to six months. Salary £200 per annum, with full residential emoluments.

HOUSE SURGEON (A) mainly in charge of Gynæcological and Ear, Nose and Throat Departments, including practitioners within three months of qualification and liable under the National Service Acts, 1939–41, when appointment will be for six months. Salary £150 per annum, with full residential emoluments.

Applications, stating age, nationality and experience, together with copies of testimonials, to be forwarded to the undersigned immediately.

H. CORLESS, Deputy Superintendent Secretary.

Industrial Medical Officer for pioneer

post near Cheltenham; 2000 employees. Salary about £800 per annum. Please give all relative particulars first letter.—Address, No. 915, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Lady Assistant required in General

Practice situate in pleasant country district. Cottage Hospital; Maternity Home. Plenty of scope for initiative and enterprise. Furnished house and car available.—Address, No. 916, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

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Home in Cheshire Town for treatment of high blood pressure, bronchial asthma, arthritis, and depression.—Address, No. 913, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Medical Practice for Sale,

Somerset District. Death vacancy. Gross income £4000, 1800 panel. £2250 for quick sale.—NATIONAL MEDICAL AGENCY, 63, Great George-street, Leeds, 1. Tel.: Leeds 21207.

For Sale, Meganos Complete X-ray

UNIT, 240 v., A.C., 50 cycles, Lysholm Grid, wall stand, couch, and developing apparatus. Perfect. Purchased 1936. Cost £326.—Apply in writing to view, 1, Tudor House, Hanworth, Middlesex.

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ILLNESS, ideally situated on the Helford River, receives a limited number of patients for care and active treatment. Special department for Insulin Therapy.—Illustrated brochure from RESIDENT PHYSICIAN, Trenython, Mawnan Smith, Cornwall. Telephone: Mawnan Smith 276.

Harley Street and District.—A number

of excellent CONSULTING ROOMS are available for full and part-time use at moderate rents. Particulars on application.—ELGOOD & Co., 1, Bentinck-street, Welbeck-street, W.1. Welbeck 8974.

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